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AEROMODELLER 963 AUGUST 2017 – Next issue published on 17th August 2017

AERO MODELLER

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Phil Ball's winning Catapult Glider used a pressed glass/epoxy Depron-cored tailplane and a button timer.

Heard at the Hangar Doors

EDITORIAL – IT'S ONLY TEMPORARY!

It is a privilege to 'mind the office' for Andrew Boddington, as Editor of AeroModeller, although tempered with extreme sadness that this temporary opportunity has come to pass. I cannot begin to think what Andrew is going through at this time, but I am assured that he has appreciated greatly all the letters and emails of condolence, sympathy and support that he has received from AeroModeller readers.

I am a life-long aeromodeller, I got hooked young and gravitated to FF power scale – CL was not for me, being left-handed I never got past the dizzy stage with left arm across my body - and then, after a break – the usual reasons – I came back to the fold and discovered RC. So I hope I have enough experience to edit AM (I did for a few years when AM was owned by a different company, about 20 years ago) and to do it justice.

This is only a temporary situation, however, as Andrew will be back in the chair later this year. In the meantime, here is the first issue of AeroModeller fully 'on my watch' – and I hope it measures up to the great standard that Andrew has set, since his tenure at AM began several years ago. I would be grateful of any feedback in terms of constructive criticism - you can email me at the usual AM address: editior@aeromodeller.com

In the meantime, can I ask for articles and event reports to be urgently submitted, please. They say everyone has at least one novel in them, so everyone of you should be able to pen a couple of articles each! As you read this, I'm already planning three issues ahead, and I must say that at the moment it's looking a bit thin – a magazine is only as good as the material it receives, so please if you think you'd like to contribute, drop me an email with your idea(s) and we can discuss it (them) – it certainly won't make you rich, but it's a lot easier than you might think!

Regards, Ken Sheppard

SHARMA DIESELS AVAILABLE FROM GERMANY!

Every time I find my copy of the latest issue of AeroModeller magazine in the post, it turns a smile on my face, you guys do a very good job. Thanks a lot.

This is the first time I'd like to address to you and I would kindly ask if it is possible to share this with your readers…

In the Jan 2016 and May 2017 issues, you featured the reviews of the Indian made SHARMA .09; .15 and .19. Diesel engines.

Those great reviews that were done by Adrian Duncan had been quite favourable.

Adrian mentioned, that those engines are no longer held on stock outside India and that they need to be imported from India individually.

In parallel, we, my friend Andreas Ullmann from ENYA engines Germany and I had been in contact with SHARMA about importing and distributing those great engines and the props in Europe.

The negotiations had now been finalised and I'm happy to inform you, that with the beginning of August 2017, SHARMA engines and Props will be available on the European market again directly from stock, held in Germany.

Sales platform will be: scalehobbyshop.de

THE AIRBRUSH COMPANY CELEBRATE 70 YEARS IN THE AIRBRUSH INDUSTRY!

Great Bargains in celebratory Summer Sale!

Alex Medwell, their General Manager, says: "Our family business history is on the following web page, which I have updated with the current staff info: https://airbrushes.com/about_us.php

Throughout June, July and August 2017, we are having a huge summer sale on equipment, including airbrushes, compressors and accessories".

For details of the Summer Sale, take a look at: https://airbrushes.com/index.php?cPath=406_530. Sale ends on 1st September 2017.

ERRATUM – DOXFORD NOT OXFORD!

In Aeropost featured in last months issue of AM referred to 'Oxford' motors, instead of 'Doxford'. Dave Chinery has written in to explain:

"Probably not worth bothering the readers with, but the Oxford engines mentioned in the first letter (Aeropost, July 2017) were actually Doxford opposed-piston engines. I spent 15 years at sea rising from Engineer Cadet to Chief Engineer on these and similar engines. Doxford's works were in Sunderland but the design was licensed all over the world. A few stats: 6 cylinders (12 pistons) about 36" bore and 80" stroke, twin-turbocharged and intercooled. Max revs 105 (cruise about 95), and between 4500 and 7000hp. All the pistons were water-cooled, connected by swinging pipes and they used a "common rail" fuel system similar to the new fad in vehicle engines. Nobody called them "Boxers"; that is more appropriate to VW, Subaru, Lycoming, etc, engines.

Best regards, Dave Chinery".

GLIDE-O-BIKE SEEMS LIKE A GOOD IDEA (!)

Yes, it's true, this was actually proposed in the USA as a viable business opportunity by the Glide-O-Bike Company, Dallas, Texas, based on the Nelson Glide-O-Bike! For just 25 cents, you could send away for plans that guaranteed turning your bike into a flying machine! The sales blurb even outlined how to set up your own 'airport' and earn money, by charging other kids for a turn! A sample of the advert aimed at the gullible, includes:

"Look at the picture. Note how the front wheel is taking off the ground. She goes gliding along. Fellows, that's not all. You can bank, ground loop, stall and sideslip. Absolutely nothing like this for fun and thrills.

You can make money, too. Other fellows will be glad to pay you 10 cents to 25 cents a ride. Operate your own airport. With every set of plans, we send you free instructions for starting and operating a Glide-O-Bike airport like the one in the picture."

The copy editor responsible for the ad, also included glowing endorsements include:

"I've already begun to give other fellows rides and make money on my airport. That's besides the fun I have myself. I never spent a quarter better, I can tell you. The Glide-O-Bike is so good I can't tell you how much I like it!" Robert Holt, Los Angeles, Calif.

No records exist that show just how many boys were taken in by this early 'scam' – unless YOU know otherwise, of course…


Now— only 25¢ will start you FLYING !

GLIDE-O-BIKE Gives Every Boy Chance to Learn Flying Principles by Actual Practice

SEND COUPON

A VERY LARGE CONTROL LINE MODEL!

Martin Collins needs an AeroModeller reader's help!

The photo shows a control line model of a British Air Ferries Aviation Traders Carvair which was built in the early 60`s, it has a 94" wingspan. Martin believes it was constructed by a couple of guys in the Southend area, possibly the owners of the Wings & Wheels model shop. There are pictures of it being flown in 1962 on the Fat Annie Carvair Facebook page at:

www.facebook.com/groups/1597142537173925/

The model was subsequently bought by Captain Laurie Rowe, who had flown the BAF fleet of Carvairs over a number of years and it was then suspended in a corner over his dining room table, which is where it was when I went to pick it up about five years ago. Following Laurie`s death, I bought the model, along with a three-bladed Carvair prop - which he had on display in his garden - and an engine cylinder and tyre. When I went to collect the plane, I was surprised to find it is a one-piece model and my estate car was not going to get it home! A quick trip to a local van hire firm resulted in it being suspended at 45° to even fit it in that! My question is - was it built as a one-piece model, if so how was it transported when being taken to shows? Maybe some damage back in the day has resulted in it being repaired into a one-piece plane?

Interestingly, the plane has the registration from the Carvair named 'Fat Annie', but has the name of another Carvair - 'Big John' - under the cockpit. The model is fitted with four diesel engines, but not being a diesel expert, I have no idea of the make of them. The model is now suspended at the top of the stairs in my house, if the wing was removable, I would have liked to have bought it along to one of the Old Warden events to put on static display, but transporting as it is, just is isn`t really viable.

If you can publish a picture of the model I would be interested to hear from anyone who remembers it and has any more information on its past. Keep up the good work with the magazine and the Old Warden events, all the best, Martin Collins.

Can anyone throw some light on this, please? Email the editor at: editor@aeromodeller.com

THE AVIATION PAINTINGS OF THE YEAR EXHIBITION

17 – 23 JULY 2017, MALL GALLERIES, LONDON

With over 400 original works of art on display in London's prestigious Mall Galleries from 130 different artists, the Aviation Artists Guild's 47th Open Annual Exhibition will attract art buyers and enthusiasts from across the world.

This is the premier event for wholly original works of aviation art, each the result of meticulous observation or careful research of aircraft, events, personalities and historical achievements blended with artistic skills in land, sea and skyscapes.

This year, the exhibition will be opened by Guild Vice President and ex de Havilland test pilot, Desmond Penrose.

Discover the wide range of techniques and styles in watercolour, oil, pen and ink, pencil, gouache, pastel and acrylic offered by members of the Guild and other artists. There will be walkabout tours and painting demonstrations during the week, from Tuesday onwards.

Opening times:

Monday 17th July (by invitation only); Tuesday to Saturday 10am to 5pm, with Thursday to 8pm. Final Sunday 10am to 12.30pm.

Admission is FREE and a £5 catalogue lists all the exhibits.

The enclosed example shows Chris Tyler's 'Lightning Getaway'.

STRATOLAUNCH AIRCRAFT MAKES FIRST ROLLOUT TO BEGIN FUELLING TESTS

The Stratolaunch aircraft has reached a major milestone in its journey toward providing convenient, reliable, and routine access to low Earth orbit. Recently, it was moved out of its hangar for the first time ever – to conduct aircraft fuelling tests. This marks the completion of the initial aircraft construction phase and the beginning of the aircraft ground and flight testing phase.

The past few weeks has seen the removal of the fabrication infrastructure, including the three-story scaffolding surrounding the aircraft, and the aircraft's full weight rested on its 28 wheels for the first time. This was a crucial step in preparing the aircraft for ground testing, engine runs, taxi tests, and ultimately first flight.

The Stratolaunch aircraft was also weighed for the first time, coming in at approximately 500,000lb (223 tons). That may sound heavy, but remember that the Stratolaunch aircraft is the world's largest plane by wingspan, measuring 385 ft. The aircraft is 238 ft. from nose to tail and stands 50 ft. tall from the ground to the top of the vertical tail.

The Stratolaunch aircraft is designed for a max takeoff weight of 1,300,000lb., meaning it's capable of carrying payloads up to approximately 550,000 lbs. As announced last autumn, the manufacturers will initially launch a single Orbital ATK Pegasus XL vehicle with the capability to launch up to three Pegasus vehicles in a single sortie mission. They have already started preparations for launch vehicle delivery to their Mojave facilities.

Over the coming weeks and months, ground and flightline testing will take place at the Mojave Air and Space Port. This is a first-of-its-kind aircraft, so the company promises to be diligent throughout testing and continue to prioritise the safety of our pilots, crew and staff. Stratolaunch is on track to perform its first launch demonstration as early as 2019.

This marks a historic step in the Stratolaunch Systems Corporation's work to achieve Paul G. Allen's vision of normalising access to low Earth orbit.

Mr. Jean Floyd - Chief Executive Officer, Stratolaunch Systems Corporation.

JET SUIT UK

EX - MARINE DEVELOPS A TURBINE-POWERED JET-SUIT…

What's it like to fly in a real-life Iron Man suit? According to the inventor of this incredible working prototype, it's "like riding a bicycle in three dimensions".

The man in the suit is Richard M. Browning, an ex-Royal Marine reservist who is, "inspired by doing things that haven't been done".

38-year-old Browning has developed the suit in his garage in Salisbury over the past 10 months. He's named it after the Greek mythological figure Daedalus, the father of Icarus.

Propulsion comes from six miniature jet engines – similar to those used in jet-powered model aeroplanes – which are mounted on the arms and the lower back. Though the suit is capable of extreme speeds and altitudes, Browning is currently exercising a bit of restraint.

"The suit can fly in most locations," he told RedBull.com. "Despite being capable of flying at several hundred miles per hour, and at thousands of feet, normal operation sees the wearer flying at no more than a couple of metres."

We guess it's true what they say; with great power comes great responsibility. (Even if that is from Spider-Man, not Iron Man.)

Source: Red Bull.com

THOUGHT FOR THE DAY

Humour is always based on a modicum of truth. Have you ever heard a joke about a father-in-law?

Up & Coming

Please note that the events listed are compiled weeks in advance of publication, and you should check before travelling in case of change. For future inclusion of your events, please send an email with date and details of the event in a format similar to those shown below to editor@aeromodeller.com

JULY

15 July
Tonbridge Gassers & Rubber Fanciers Indoor, Sports Centre, 601 Maidstone Road, Rochester ME1 3QJ. 18:30 to 22:00. FF & LW RC. Eric 01622 737814 eric.przyjemski@btinternet.com or Steve 0208 942 5000

15-16 July
Barton Club Speed Weekend, Barton, Manchester. All Open Classes, F2A, Barton Club Speed, 'Have a Go', SAM35 Vintage Speed.
Dick Hart 01387 820335
www.controlline.org.uk
www.sam35.org

16 July
'Summerglide' SAM35 Area Postal <52" Classic & Vintage Glider at Area Venues. Pre-entry essential £3 (juniors free). John Ashmole, 164 High Road, Weston, Spalding, Lincs PE2 6JU.

22-23 July
Scale Weekend at the Shuttleworth Collection, Old Warden SG18 9EP. FF, CL & RC scale. Including Voetsak CL Racing on Sat, Earl Stahl & Masefield Trophy for rubber FF scale on Sunday 23rd. SAM35 CL speed, scale & autogyros.
www.modelair.info www.sam35.org

23 July
Barton Racing Day, Barton, Manchester. Classic 15 & Barton B CL TR.
John Broadhead 01524 251592
www.controlline.org.uk

23 July
Oliver Tiger Combat, at Old Warden SG18 9EP.
Mick Lewis 01453 542367
combatflyers@talktalk.net

30 July
SAM1066, Area 8, Salisbury Plain. 10:00 to 18:00. E36, Mini Vintage, BMAS Club Classic, Comb V/C CLG/HLG, Comb V/Mod Cd'H and Sports FF Meeting. Use of DT recommended but not mandatory. 02392 550809
www.sam1066.org

30 July
Barton F2C, Barton, Manchester. F2C & F2CN (no team selection).
Malcolm Ross 01925 766610
www.controlline.org.uk

30 July
Vintage Combat, Scampton.
Mick Lewis 01453 542367
combatflyers@talktalk.net

AUGUST

2-3 August
SAM35 FF and CL Fly-in, BMFA Centre, Buckminster Lodge, Sewstern, Grantham, NG33 5RW. www.sam35.org Contests on Thursday only – 36" Hi-start Glider, All-in Cabin Precision, Cloud Tramp Duration – entry £3 on the day (in addition to field admission fee).

13 August
CL Floatplanes at Leceister MAC.
Andy Green
andy.w.green@gmail.com
www.leicestermodelaeroclub.org.uk

13 August
Mini Goodyear/Family Fun Day, Barton, Manchester.
www.controlline.org.uk

19-20 August
SAM35 Speed, Colerne. Vintage CL speed. www.sam35.org

26-28 August
BMFA Power Nationals, Barkston Heath. www.bmfa.org

26-28 August
Vintage Combat, BMFA Nationals, TBC. Mick Lewis 01453 542367
combatflyers@talktalk.net

SEPTEMBER

3 September
Peterborough Flying Aces Nationals, Ferry Meadows, Nene Park, Peterborough PE2 5UU. Silent FF only event (no IC) for scale, glider, rubber duration, CO2, Electric, etc. New KK Elf series of comps sponsored by Vintage Model Co. Hi-start bungee supplied.
Brian Waterland 01778 343722
www.peterboroughmfc.org

3 September
Timperley FF Gala, MOD North Luffenham. 10:00 to 17:30. Comb-Rubber, Comb-Glider, Comb-Power, Comb-HLG/CLG, Mini-Vintage, E36. Trophies and prizes. Airfield charge. FF Sport flyers welcome.
Gerry Ferer 0161 928 4955
gferer@hotmail.com

10 September
Vintage Combat, BMFA Centre, Buckminster Lodge, Sewstern, Grantham, NG33 5RW.
Mick Lewis 01453 542367
combatflyers@talktalk.net

10 September
Goodyear Day, Barton, Manchester. British, Open & Mini Goodyear.
Ed Needham 01614 855193
www.controlline.org.uk

16-17 September
Barton F2 Weekend, Barton, Manchester. F2A, F2B + Barton Cup, F2C & F2CN.
Malcolm Ross 01925 766610
www.controlline.org.uk

17 September - 15th October
SAM Postal Contest (SAM35 & 1066 Worldwide) 'Lulu and Friends'. For Lulus and similar Gliders. Also 36" Hi-start Gliders..
John Ashmole,164 High Road, Weston, Spalding, Lincs PE2 6JU.

17 September
'Autumn Trophy' SAM35 Area Postal for P30 Rubber at Area Venues. Pre-entry essential £3 (juniors free). John Ashmole, 164 High Road, Weston, Spalding, Lincs PE2 6JU.

23-24 September
Festival of Flight at the Shuttleworth Collection, Old Warden SG18 9EP. Including Voetsak CL Racing & 'Rubber Bowden' on Sat, Vic Smeed Memorial event on Sun. NEW – The Rubber Bowden – a precision contest for cabin rubber models. For rules and further details, visit www.sam35.org, or e-mail johnashmole@yahoo.co.uk
For general event info, see www.modelair.info

24 September
Oliver Combat for the John Oliver Memorial Trophy, at Festival of flight Old Warden.
Mick Lewis 01453 542367
combatflyers@talktalk.net

24 September
Vintage Team Race, Barton, Manchester. VTR A, VTR B, Barton B, Vintage 1/2 A.
John Mealing 0117 947 8758
www.controlline.org.uk

30 September
Croydon Coupe Day plus SAM 1066, Area 8, Salisbury Plain. 10:00 to 18:00. F1G, Vintage Coupe, E36, Ryback A2, Comb V/C CLG/HLG, Unorthodox and Sports FF Meeting. Use of DT recommended but not mandatory. 02392 550809
www.sam1066.org

OCTOBER

1 October
'Octoberfest' SAM35 Rally, BMFA Centre, Buckminster Lodge, Sewstern, Grantham, NG33 5RW. Voetsak CL Racing.
www.sam35.org

8 October
'Autumn Trophy' SAM35 Area Postal for P30 Rubber at Area Venues. Pre-entry essential ú3 (juniors free). John Ashmole
editor@peterboroughmfc.org
www.sam35.org

8 October
Goodyear Marathon, Barton, Manchester. 1000 lap Goodyear CL TR.
Ed Needham 01614 855193
www.controlline.org.uk

8 October
SAM35 Vintage RC and CL at Middle Wallop, SO20 8DY. All vintage types, Tomboy, Radio Assist and Single Channel. Control Line 'Bee Bug Bash' etc. Sorry no FF.
David Lovegrove 01491 200558
david.lovegrove11@btinternet.com
www.sam35.org/events

14 October
Delyn MFC Swapmeet 2, St. Winefride's Primary School, Holywell CH8 7NJ. 09.00 to 13.00. Mike Parry 01352 710167
crashparry@gmail.com

14-15 October
Barton Club Speed Weekend, Barton, Manchester. All Open Classes, F2A, Barton Club Speed, 'Have a Go'.
Dick Hart 01387 820335
www.controlline.org.uk

15 October
Beverley & District MAC Autumn Swapmeet, Tickton Village Hall, near Beverley HU17 9RZ. 09.00 to 12:00. Tables ú5.00
Brian Jenkins 2bee.jays@live.com
07970 959875
www.badmac.btck.co.uk

15 October
Vintage Combat, Darley Moor Raceway, Ashbourne, DE6 2ET.
Mick Lewis 01453 542367
combatflyers@talktalk.net

22 October
Barton Racing Day, Barton, Manchester. Classic 15 & Barton B CL TR.
John Broadhead 01524 251592
www.controlline.org.uk

Full details of BMFA events can be found at: www.bmfa.org

Jim Arnott came down from Scotland to take second place in BMFA Rubber.

BLUSTERY AND BALMY BARKSTON!

MIKE EVATT AND MARTIN DILLY CAMERAS AND NOTEBOOKS IN HAND BRAVED THE SOMEWHAT VARIABLE CONDITIONS AND BRING YOU THE BEST OF THE FF DURATION ACTION.

Reporting on the Nationals is bit like an assignment from Hell. Over three days nearly 30 Free Flight Championship events were scheduled including many other non-Championship events, Space events and SAM 35 contests, including folk turning up just to fly for fun with flying taking place

Phil Ball's winning Catapult Glider used a pressed glass/epoxy Depron-cored tailplane and a button timer.

BMFA Rubber winner was Phil Ball.

Ian Clark prepares his Catapult Glider entry.

Terry Dobson gives his BMFA Power model the heave-ho to take third place.

Peterborough's Peter Gibbons flew this E-30 model.

over several acres. This coverage is therefore something of a snapshot of the weekend's activities bringing you photos, results and comment.

The British Free Flight Nationals is probably the largest Free Flight Jamboree in the World. Thanks, must go to Mike Woodhouse and his team on the Free Fight Tech Committee for the organisation of this year's extravaganza.

This report will concentrate on the free flight duration events. It is left to others to report on the Bowden Trophy (john Ashmole) and the Scale events (Bill Dennis), both of these additional reports appearing elsewhere in this issue.

SATURDAY – Martin Dilly

Day one, Saturday of the 2017 Nationals, started sunny and with a moderate breeze. Contest Directors, Mike Woolner and John Cuthbert, in bow ties and dinner jackets, lent the proceedings a touch of elegance befitting the major event on the year's free flight calendar. However, those who spent time admiring the organisers' garb and delayed making their contest flights early in the day regretted it later, as the wind steadily increased and by mid-afternoon was 31kts, gusting to 43! This day is mainly for BMFA events, plus a few of the minor events.

Most BMFA Rubber flyers (the rules allow just 50g of rubber) had only managed one flight before the wind put paid to more, and only four completed a second. A long gap ensued before the wind abated a little, allowing Phil Ball to put in a third max a few minutes before the end of the contest; having damaged the model he used for the first two maxes, he flew a ten-year-old Waif (described in the 2011 Free Flight Forum Report) which had actually won the first-ever 50g BMFA Rubber contest.

BMFA Glider has rather strange rules which must surely limit the number of potential entrants. Instead of allowing a normal bunt-equipped glider to compete with its bunt and circle towing system disabled, they require the entire towhook system to be removed and replaced with a permanent solid fixed hook in order to use a 75m towline. Today, it is clearly the bunt facility, rather than circle towing, that enables a model to reach double the towline height at launch, yet circle tow gliders that don't bunt are still allowed the same 50m line length as ones that do.

Regardless, 21 brave glider flyers returned scores, but only Roger Heap, Colin McKenzie and John Williams maxed out. Roger flew a Makarov bunter retro-fitted with a straight towhook and formerly flown by the late Jane Howick; the McKenzie model was a Classic Pelican, designed by Jim Waldron in 1956, while John's was an electronic all-singing, all dancing F1A. With the weather on the Saturday evening politely described as inclement, the BMFA Glider fly-off was postponed till the Monday morning; with a low cloud base and poor visibility, a 100 metre bunt might actually be a disadvantage, but eventually it was Williams, Heap and McKenzie who

Roger Heap flew this straight-tow Makarov model to second place in BMFA Glider.

Ron Marking's BMFA Electric model off for a max before the wind started.

Mike Marshall's BMFA Rubber model had a snazzy covering job.

Mike Quinn flew a Soopa Zeus in SLOP Day 2

medalled in that order, with the Thurston Trophy going to John.

BMFA Power, too, was badly affected by the rapidly increasing wind strength and only three flyers managed a second flight. Ultimate winner Alan Jack was the only one to max out to take first place and the Sir John Shelley Cup.

In BMFA Electric, three flyers managed a full score. Electric expert Trevor Grey took top honours with a fly-off time of 6.59, followed by Chris Strachan and Chris Redrup.

The Tailless class provides fun for those that compete. Spenser Willis outclassed Maurice Doyle and Dave Taylor to win the event.

Phil Ball topped Catapult Glider with his second win of the day without the need of a fly-off. Runner up was G Percival, with C Parry in third spot.

The Woman's Cup had only one score so Gillian Gibson won the event as she did last year

The Frog Junior event was a little better supported with two flyers James Day just sneaking in ahead of Jamie Mosely.

SUNDAY – Mike Evatt

What a difference a day makes! Sunday dawned with much lighter winds that became lighter as the day progressed.

Dave Taylor placed third in Tail-less.

One could almost imagine it was summer. The wind direction varied little, but enough to initiate an extension of the flightline part way through the day. There was also a hold from 18:00 to 18:30 hrs, due to an aircraft movement.

Despite the quite balmy conditions, only a handful of flyers managed to max out. Conditions were really quite tricky.

In F1A Glider only Chris Edge and Peter Tribe made it to the fly-off, finishing in that order, with Stuart Darmon in third place.

The position in F1B Rubber was very similar, with Peter Martin and Phil Ball flying off to decide top spot, with Mike Evatt next in line.

F1C Power was poorly supported with only four entrants. Three made it to the fly-off. This was won by an excellent flight from Neil Allen from Alan Jack and Mick Lester, who were only a couple of seconds apart.

It was something of a surprise that no one maxed out in F1Q Electric. The winner was Ian Kaynes, flying the model featured in the 2017 Free Flight Forum Report. It was interesting to note that the next two places were taken by flyers who had taken inspiration from American IC models. Chris Strachan was flying a Ramrod 325, whilst Ray Elliot used a Mini Satellite.

It is a pity that the IC power classes are in decline, but Slow Open Power still proves popular and bucks the trend. Some thirteen individuals posted scores and seven of them made the fly-off. This was a spectacular event. Phil Ball and Peter Watson found good air in spades! Phil took the Trophy with a flight of 24.53, leaving Peter runner up with 22.09. Peter Woodhouse came third with 10.07.

Hand Launched Glider had a quite disappointing entry. No fly-off was required here, with Paul Cowley taking top spot from Julian Pennington and Ivan Clark.

P-30 Rubber had the most entries in any class over the weekend. Peterborough's Mick Page played a waiting game to ensure first place, ahead of Colin McKenzie and Denis Davitt.

Vintage Rubber/Power was quite well-supported and four individuals needed to fly again. Spenser Willis eclipsed the pack with a flight of 10.38, taking the event from Colin Foster and Anthony Winter.

Colin Shepherd flew this immaculate Glowworm, originally flown by New Zealand's John Shepherd in the five-way tie at the 1960 World F1C Championships.

Chris Strachan was one of three to max out in BMFA Electric ended in 2nd Place

Peter Watson used a stretched Satellite wing and stab plus a carbon boom on this BMFA Electric model.

Peter Watson used a Gordon Cornell tweaked OS FP15 in his Slow Open Power model, but a 22 minute fly-off only got him second place.

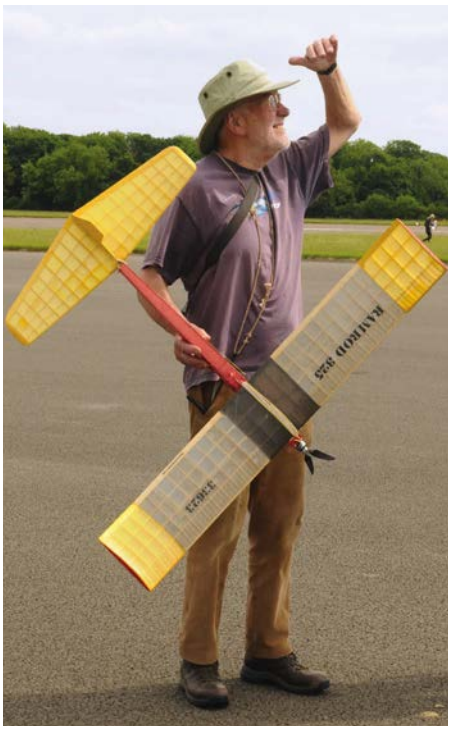
John Williams won the two man BMFA Glider fly-off.

Spencer Willis won the Lady Shelley Cup with his Tailless rubber model.

Peter Woodhouse and Slow Open Power model had a busy weekend.

Neil Allen on his winning way in F1C

Trevor Grey and his purpose built F1Q



A Ramrod 325 was Chris Strachan's preferred choice in F1Q

A relaxed Chris Edge on his way to win F1A

Phil Ball in a rush to make the fly-off in F1B

Mark Benns prepares for his first ever F1B contest

The E30 Electric power event was quite well-supported, with Roy Marking winning the event after a fly-off with Peter Gibbons and Chris Redrup. Fourth placed man, Trevor Grey, was flying an interesting model featuring a brushless motor coupled to a Dan's timer, an Aeris Radio DT and a 7A ESC.

MONDAY – Mike Evatt

Monday's events comprised the FAI 'Mini' events, together with the BMFA's Classic contests and the rest of the Vintage events, E36 and CO2. The weather on this day was yet another contrast, the light wind had swung to a cold Northerly, and the low cloud base and mist did nothing to aid visibility. As

Mick Page bides his time to win P30

Chris Edge notched up his second win of the weekend with his F1H

Alan Jack won ½A Power with his modern take on the class

these contests were not flown in rounds, flyers in the main delayed starting until conditions improved.

F1G was won with a full house by Phil Ball, closely followed by Peter Woodhouse and Neil Allen.

F1H/A1 gave Chris Edge his second opportunity of the weekend to collect a pot. He won the three-man fly-off from Gary Madelin and Andy Crisp.

Alan Jack won both F1J and BMFA 1/2A Power. In F1J he triumphed over Paul Chapman and Trever Payne, whereas in 1/2A, David Ginns and Terry Dobson were placed second and third.

E36 is, I guess, something of a success story. There seemed to be many more models flying that figured in the official results. Six flyers made it to the fly-off. Peter Watson took the title from Chris Redrup and Ron Marking, despite crashing his best model in practise. E36 is becoming more interesting now that established IC power flyers are participating. Perhaps the future is Electric after all!

Mini Vintage is always popular and is the province of Keil Kraft Senators and others of that ilk. Again, it was interesting that only one flyer maxed out to take the title. Winter, Wilkinson and McHugh took the top three places.

Combined Classic Rubber/Power was won by Jim Arnott from Stephen Barnes and Jim Paton, whereas Classic Glider was taken by Colin Foster, from Roger Heap flying a Caprice, and Dave Hambley.

The final two classes are something of an acquired taste.

Vintage Glider has many adherents and this year was won by the seemingly unbeatable Colin Foster from Taylor and Arnott.

Terry Dobson had a busy weekend. Seen here with his 1/2 A power entry

A gentle launch by Andrew Powis with his E30

RESULTS -

SATURDAY 27/05/17

BMFA GLIDER 23 flew

1	J Williams	7.30	+2.49	
2	R Heap	7.30	+2.35	
3	C McKenzie	7.30	+2.20	

BMFA RUBBER 13 flew

1	P Ball	7.30		
2	J Arnott	6.41		
3	P Woodhouse	6.40		

BMFA POWER 7 flew

1	A Jack	7.30		
2	T Payne	6.14		
3	T Dobson	4.30		

BMFA ELECTRIC 12 flew

1	T Grey	7.30	+6.59	
2	C Strachan	7.30	+5.12	
3	C Redrup	7.30	+2.29	

CATAPULT GLIDER 7 flew

1	P Ball	4.14		
2	G Percival	3.48		
3	C Parry	3.26		

WOMENS CUP 1 flew

1	G Gibson	2.09		

TAILLESS 3 flew

1	S Willis	5.58		
2	M Doyle	2.15		
3	D Taylor	2.01		

FROG JUNIOR 2 flew

1	J Day	7.30		
2	J Mosley	5.42		

SUNDAY 28/05/17

F1A GLIDER 17 flew

1	C Edge	12.30	+9.00	+4.49
2	P Tribe	12.30	+9.00	+2.46
3	S Darmon	12.30	+8.26	

F1B RUBBER 7 flew

1	P Martin	12.30	+5.34	
2	P Ball	12.30	+2.47	
3	M Evatt	12.00		

F1C POWER 4 flew

1	N Allen	12.30	+8.31	
2	A Jack	12.30	+5.40	
3	M Lester	12.30	+5.38	

F1Q ELECTRIC 6 flew

1	I Kaynes	12.24		
2	C Strachan	12.12		
3	R Elliot	12.01		

SLOW OPEN POWER 13 flew

1	P Ball	7.30	+24.53	
2	P Watson	7.30	+22.09	
3	P Woodhouse	7.30	+10.07	

P 30 RUBBER 26 flew

1	D Page	6.00	+1.58	
2	C McKenzie	6.00		
3	D Davitt	5.52		

HAND LAUNCHED GLIDER 7 flew

1	P Cowley	6.48		
2	J Pennington	6.15		
3	M Benns	5.55		

VINTAGE RUBBER/POWER 14 flew

1	S Willis	7.30	+10.38	
2	C Foster	7.30	+5.39	
3	A Winter	7.30	+3.26	

E30 ELECTRIC 9 flew

1	R Marking	6.00	+5.25	
2	P Gibbons	6.00	+3.01	
3	C Redrup	6.00	+2.45	

MONDAY 29/05/17

F1G RUBBER 13 flew

1	P Ball	10.00		
2	P Woodhouse	9.54		
3	N Allen	9.20		

F1J POWER 3 flew

1	A Jack	8.36		
2	P Chapman	6.10		
3	T Payne	6.00		

BMFA 1/2A POWER 3 flew

1	A Jack	6.00	+036	
2	D Ginns	6.00		
3	T Dobson	4.13		

F1H GLIDER 13 flew

1	C Edge	10.00	+4.50	
2	G Madelin	10.00	+1.58	
3	A Crisp	10.00	+1.10	

E36 ELECTRIC 11 flew

1	P Watson	6.00	+1.53	
2	C Redrup	6.00	+1.42	
3	R Marking	6.00	+1.22	+1.04
4	T Grey	6.00	+1.22	+1.01

MINI VINTAGE 17 flew

1	A Winter	6.00	+0.45	
2	P Watt	6.00		
3	J Sanderson	5.53		

CLASSIC RUBBER/POWER 7 flew

1	J Arnott	7.30	+2.57	
2	S Barnes	7.30		
3	J Paton	6.18		

CLASSIC GLIDER 9 flew

1	C Foster	7.30	+2.29	
2	R Heap	7.30	+2.02	
3	D Hambley	7.06		

VINTAGE GLIDER 4 flew

1	C Foster	7.30		
2	R Taylor	6.37		
3	J Arnott	3.53		

CO2 5 flew

1	C Strachan	6.00	+2.45	
2	S Philpot	6.00	+2.12	
3	G Warburton	6.00		

OVERALL NATIONAL CHAMPIONS

GLIDER

1	C Edge	18
2	R Heap	12
3	J Williams	9

RUBBER

1	P Ball	24
2	P Woodhouse	12.5
3	P Martin	9

POWER

1	A Jack	15
2	P Ball	9
3	T Payne	7

ELECTRIC

1	R Marking	16
2	T Grey	15
3	C Redrup	14

NATIONALS JUNIOR CHAMPIONSHIP

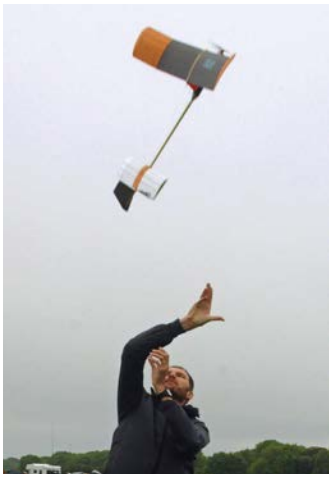
1	James Day	11.44
2	Jamie Mosley	9.29
3	George Day	5.01
4	Mia Dixon	4.49

Alan Jack checks over his SLOP model

Pete Watson programmes a Dan's Timer on an E36

Peter Watt's immaculate KK Senator with wing DT took 2nd spot in Mini Vintage

A colourful E36 by Julian Pennington



A perfect E36 launch from Simon Dixon

Trevor Grey's latest E30 featuring a brushless motor

A gentle F1G launch by scale guru Bill Dennis

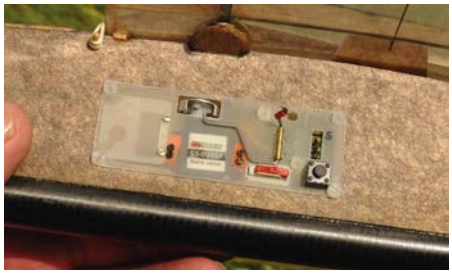
Chris Strachan took the two-man fly-off in CO2 from last year's winner Steve Philpott, and Gordon Warburton came in third place

The Gala National Champions are decided by an aggregate of an individual's performances in a number of specified qualifying events.

This year's champions are: Glider – Chris Edge, Rubber – Phil Ball, Power: – Alan Jack and Electric – Ron Marking.

Final Comment – Mike Evatt

Another Free Flight Nationals is over! Perhaps one could have wished for better weather, but it gave a lot of flyers great enjoyment whether they were there to compete, or just fly for fun and be part of the UK's Free Flight Community. The crowds on the Sunday were truly amazing. Again, thanks to the BMFA and the FFTC for making it happen, and of course to the RAF for giving permission to use this amazing facility. However, there were several instances of individuals not reading instructions, parking in the wrong places, etc, etc. This sort of behaviour, although perhaps unintentional, can and will cause us to lose excellent flying sites. ●



The timer/RDT assembly on Trevor Grey's latest E30

Mick Quinn with a replica of Sandy Pimenoff's No 18. On of the Cranfield Classic winners of 1960

A happy Roger Heap with his classic 'Caprice'

Nationals FF Scale report

Bill Dennis reports on all the action at the Bank Holiday Nats weekend at Barkston…

Free flight scale activity is always dominated by the weather, much more so than duration. One can fly duration enjoyably in almost any conditions, but with scale, the point of doing it becomes less obvious as the wind-speed increases and we offer our 'splintering sacrifices', to quote Pylonius, to the Gods of full-size aviation. We had plenty of weather this weekend - and it did exactly as predicted.

We began on Saturday morning with the Flying Only class for Aeromodeller and Model Aircraft designs. A healthy twelve entries were confronted with a stiff, but flyable breeze. It would be nice to see more new models; there are plenty of designs that can be built quickly. One example was Pete Fardell's Hollandair Libel, designed by Ray Malmstrom. I had never heard of this aircraft and, to assuage my curiosity, I googled it. The first site listed referred to a lawsuit brought by Gordon Ramsey against a food critic who had cast aspersions on his hollandaise sauce, but the next one revealed a neat high-wing monoplane with a pod-and-boom fuselage, reminiscent of the Edgar Percival EP9. It flew very well indeed, although Pete had had to reduce the 10° of downthrust shown on the plan.

Another new model was Brian Waterland's Ron Moulton Ryan NYP, wisely enlarged by the permitted 10%. There is a lot of wood in this design, but if it is built lightly, it can go well, with no problems from the lack of dihedral.

The event was won by Mike Smith's original Martinsyde Elephant, and Mike was the first recipient of the Aeromodeller poster trophy.

By lunchtime, the wind was beyond the pale, and all activity had to be postponed

Here are some of the Kit Scale flyers, taken straight after the event. Winner Gareth Tilston is front right.

Bill Dennis's Hannover CLII can take off and fly well, but not in the same flight!

to the next day, with Kit Scale in the morning. Twenty entries shows the rules seem to be working, and squeezing the activity into one hour certainly makes it a spectacle. It is important to start early to get the flights in, as even the target time of thirty seconds can take a model some distance in what had now reduced to a moderate breeze. The first three places were very close and taken by high-wing monoplanes, which will have best chance in the event of rough conditions. The downside is that they seem more prone to catch lift, and leave you willing the thing to come down! Winner was Gareth Tilston with the ever-popular and reliable KK Family Cruiser.

After a brief respite, it was Open Flying Only and by now we were down to a light breeze. The flying was of a very high standard, and it was difficult to separate the models; the few marks given for realism help a little here. Of all the excellent flights, the best was the rubber Puss Moth flown by Don Spray, who was one of three visitors from New Zealand. The model flew steadily upwind over the judge's head, before turning back for a superb approach and landing. All the subsequent flights wandered off to the buzz the adjoining Bowden flyers.

The weather forecast predicted a period of near-calm between 4pm and 9pm and this is exactly what happened as we prepared to run all six rounds of the trophy events. It was one of the most

Gareth Tilston entered this Bird Dog in AM/MA flying only.

New Zealander Ricky Bould campaigned this Comper Swift with a big CO2 motor.

Another welcome visitor from NZ was Don Spray, seen here with the Credgington trophy for Open Flying Only

This is Mike Smith's original Martinsyde Elephant, winner of the Aeromodeller/Model Aircraft Flying Only.

interesting sessions I can recall, and some models with good static scores were to be overtaken in the flying.

The DH60 Moth of Gareth Tilston took the CO2/electric class. A strong challenge by Stephen Glass's Saab Tunnen jet was thwarted by a low static score, hand launch and lack of undercarriage for take off and landing, but it was a superb flyer. In rubber, Andy Sephton's Lacey took advantage of the calm conditions to take the Model Flyer Trophy, pushing the new Nieuport 11 of Rich Moore into 2nd place. The paint of this one was just about dry, but its potential was obvious as it floated past at a very convincing speed.

After a short break for the very undramatic arrival of a full-size aircraft, it had got to the point where those about to launch were standing around in the middle of the runway, looking for any air movement to launch into. The Power class saw perhaps the biggest upset.

Andy Sephton's winning Lacey.

This is Rich Moore's brand new Nieuport 11, finishing a creditable second, given that it was finished that morning!

Kit scale winner, Gareth Tilston, also showed us this Lanc from the Brian Waterland design.

Stan Mauger with his Antarctic Auster, proving that monoplanes can actually win!

Brian Waterland with his Ron Moulton Ryan NYP, wisely enlarged by the permitted 10%.

Paul Briggs with his Aerographics SE5a.

Mike Smith's gorgeous Snipe had a big lead in static, but was unable to take off in its first five attempts. Andrew Hewitt's Bristol Scout confirmed that this subject just will not ROG, while Bill Dennis's Hannover CLII could not take off and fly well at the same time. Gareth Tilston's DH75 and Mike Kelsey's AW FK3 put in strong performances, but it was another New Zealander, Stan Mauger, who came through with a string of excellent flights from the Antarctic Auster, proving that you don't need a big greeny-brown biplane to win.

By the time we finished, we were all dead on our feet, not least the judges who did sterling work for nearly four hours. Many thanks to Chris Allen, Ian Pallister, John Minchell, Phil Smith, Dave Causer and Andrew Hewitt. The two days had not been easy for the organisers; trying to maintain communication as the weather disrupts the plans, is a real problem, but we got there. ●

GETTING TO GRIPS WITH 'SUPERCAP' CHARGING

Bob Lee explains how to get the best out of this small model power source...

There have been several articles on the use of supercaps to power small free flight models recently, the one by Duncan Pepper in the Dec 2016 Aeromodeller being an excellent source of information. The aim of this article is to explore the issue of charging these devices in more detail, with the end goal of getting the best performance possible from supercap powered models. Clearly some people are having a lot of success (and fun) using these devices, but I'm sure that we can do more, once the issues involved are understood.

Let's start my looking at just what a supercap can do for us, and why you should even consider using them in the first place.

All capacitors are basically energy storage devices, the physics of how they do it are different to a battery, but they can be used to do a very similar job to batteries. When I was at school (OK, a long time ago) I still remember the day that I was told that capacitors were measured in units of Farads, and that a Farad was such an enormous amount, that usable capacitors were measured in uF (one millionth of a Farad) or pF (one millionth of one millionth of a Farad). However, things have moved on, and today it is possible to buy devices called supercaps. Maplin sell these in the range of 1.5F to 360F for just a few pounds each. It's supercaps in the range of 10F to 50F that are likely to be of most use to us modellers.

It's all very well talking of capacitors and Farads, but just how much energy are they storing? Supercaps store charge measured in Coulomb's and energy measured in Joules, neither of which is likely to mean very much to you. However, most people that have been involved in any kind of electric flight are familiar with talking about batteries in mAh (millamp hours). If we talk of a 100mAh or 1000mAh battery, then most of you have an idea of what this represents. Can we do the same for supercaps? The answer is yes.

You can think of a 10F supercap as representing 7.5mAh and a 50F supercap as 37.5 mAh. This doesn't sound very impressive, so a better way to think of it is that a 10F supercap could supply 1A for 27 secs, and a 50F could supply 5A for the same time. Now we are in the sort of area that should prove useful for small free flight models.

There are two things that we need to bear in mind. The first is that using a single supercap, we only have a peak voltage of 2.7V, which is their maximum rated operating voltage. This is less than we would expect from a lithium battery. The second thing to bear in mind is

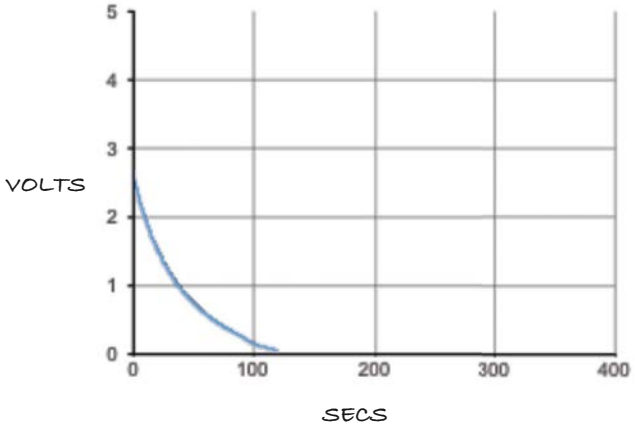


Fig. 1. TYPICAL DISCHARGE CURVE WHILE RUNNING A MOTOR

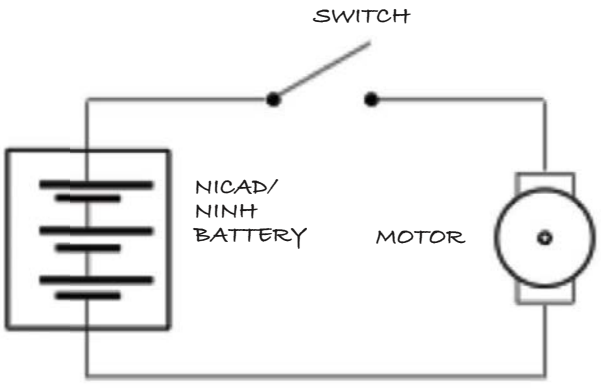
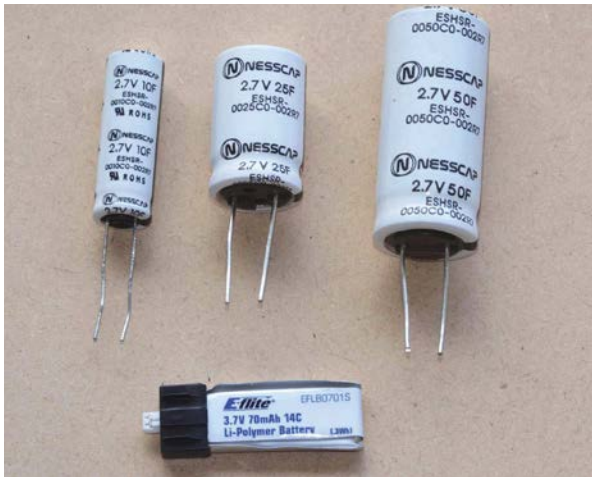
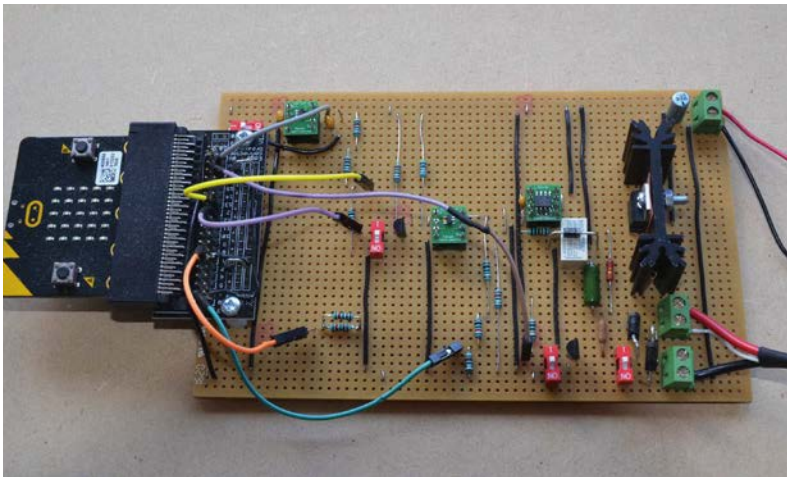


Fig. 2. WAS SIMPLE WHEN WE USED NICAD/NIMH BATTERIES



10F,25F and 50F supercaps compared to a 70mAh battery



My prototype constant current charger, much more complex and may be a step too far

that a battery delivers a voltage that is fairly constant during the discharge. A supercap delivers voltage that drops very rapidly, ending in a long slow tail at a much lower level than the peak value. In many ways, more like a rubber motor. An example of the discharge curve is shown in **Fig.1**.

You also need to think about weight. I have said that a 50F supercap represents 37.5mAh and it weights 11.3g. An equivalent 30mAh lithium battery weights only 1.3g.

So far you are probably thinking that I'm not painting a very good picture of supercaps - less energy than a battery, heavier, and you get all the power in a short burst at the beginning. So why bother?

One reason is simplicity. Years ago we flew small free flight electric models using an arrangement like **Fig.2** with 2 or 3 Nicad or NiMH batteries, a switch and a motor. We closed the switch and the motor ran till the battery was flat, then stopped. We could recharge for the next flight in a few minutes. Then lithium cells became the norm, smaller and much lighter, but gave us a problem in that you will damage a lithium cell if you fully discharge it, so you can't just let it run down to zero. Now you need an arrangement like **Fig.3**, where you have a controller between the battery and the motor to give a timed run that doesn't fully discharge the battery (an example of such a controller is the Zombie from Atomic Workshop). This works well, but has added complexity and cost. Supercaps allow us to use an arrangement like **Fig.4**, where even the switch is optional - it's simple, low cost and can be recharged quickly.

Supercaps are also very good for indoor models, where the aim is always to not hit the ceiling, and their discharge decay (**Fig.1**) helps a lot in this respect. There is also another very good reason for exploring supercaps, it's a challenge! And who doesn't like rising to a challenge?

Clearly, from all of the above, if you are to get the best from supercaps, you need to start by optimising the charging.

Before I discuss supercap charging, we need to be aware of a couple of parameters from the datasheets for these devices. The first is the 'rated voltage'. This is given as 2.7V and is the maximum voltage that they can sustain without damage. Briefly putting on my professional hat and having fielded many questions in the past about operating electronic devices outside of datasheet limits, I'll just say that if you operate above this, then you are out of datasheet parameters and "on your own, on your head be it".

The second parameter that we need to

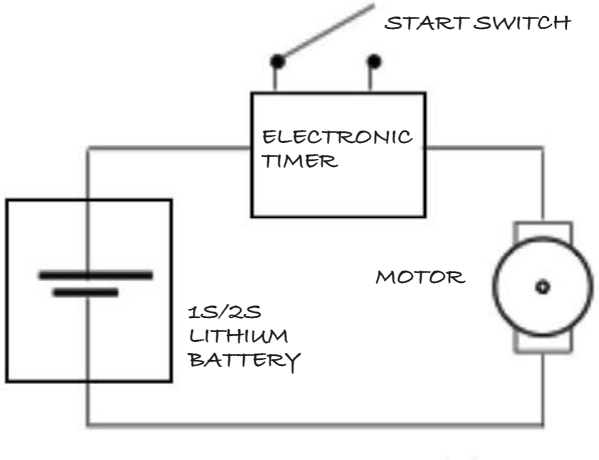


Fig. 3. LITHIUM BATTERIES MADE IT MORE COMPLICATED

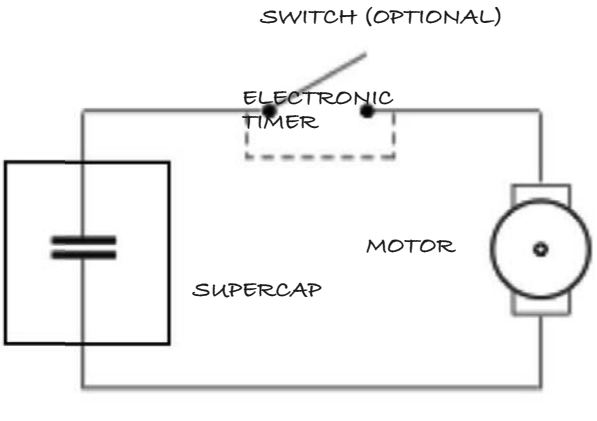


Fig. 4. SUPERCAPS MAKE IT EASY AGAIN

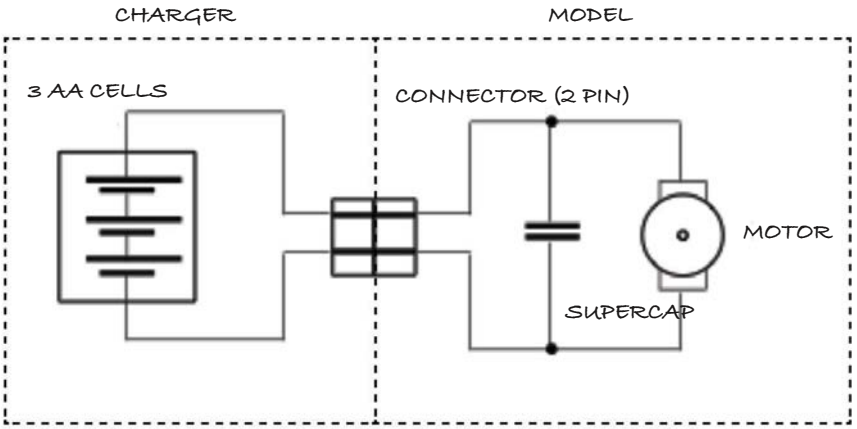


Fig. 5. SIMPLE CHARGER, MOTOR RUNS WHILE CHARGING AND LIMITS THE CHARGE VOLTAGE

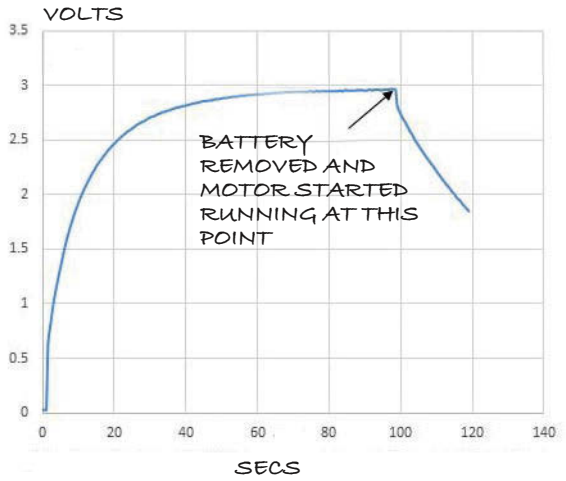


Fig. 6. CHARGING FROM 3 X AAA CELLS WHILE THE MOTOR IS RUNNING (NO SWITCH). NOTE THAT THE FINAL VOLTAGE WAS A LOT LESS THAN THE BATTERY VOLTAGE (4.5V)

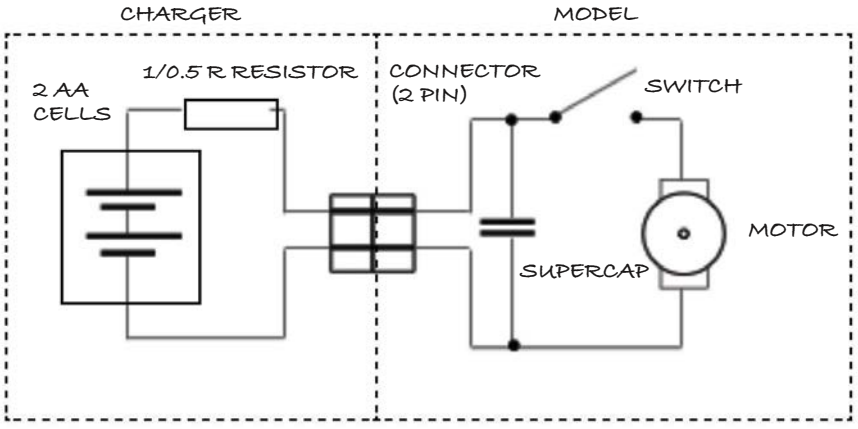


Fig. 7. SIMPLE 3V CHARGER. ITS MORE THAN THE MAX RATING FOR THE SUPERCAPS, SO YOU ARE ON YOUR OWN HERE!

be aware of, but actually probably isn't so much of an issue, is the maximum current (charge or discharge) that the supercap can sustain. For the 10F device, this is 5.6A and for the 50F its 10A, unlikely to be an issue, but worth being aware of.

The simplest charging arrangement is shown in **Fig.5**. We have 3 AA cells as the charger and in the model, the supercap with the motor wired across it, there is no switch. You simply charge the supercap by connecting the battery across it. The motor will start (keep hands clear) and you will hear the motor speed up as the capacitor charges.

When the motor has stopped speeding up, then the supercap is fully charged and you can disconnect the battery and launch the model. Note that you have to launch immediately, as soon as you disconnect the battery you are on the steep part of the discharge curve and losing power fast.

The arrangement described above should by now be ringing alarm bells. I said that the maximum voltage rating of the supercap is 2.7V, but 3 x AA cells are being used to charge it, which is 4.5V, so isn't this damaging the supercap? Let's look at the charging curve, which is shown in **Fig.6**. The voltage across the supercap starts at zero then initially rises rapidly. As it nears full charge the rate of voltage rise slows down until it eventually approaches the final value of approximately 3 volts. So we have a 4.5V battery, but the supercap only charged to 3 volts - why? The answer lies in the fact that the battery has an internal resistance and the motor is always drawing current from the battery, through this resistance. This is causing the voltage at the battery terminals (and hence the supercap) to be less than the open circuit voltage of the battery. A smaller motor would have drawn less current and therefore the final charge voltage would have been higher(higher than the rated voltage of the supercap).

The charger just described can work, and is being used very successfully by several people, however, it has several disadvantages. The first of these is that the final charge voltage achieved is a matter of trial and error. It's going to depend on the number of cells used in the battery, and the current being drawn by the motor. Since the motor (and its prop) are probably a given, then you only have the number of cells to play with, which probably means that you will end up charged to either less than, or more than, 2.7V. The final charge voltage will also depend on the state of the batteries, as they become depleted the internal resistance will increase. I also mentioned earlier the issue that with no switch in circuit, you have to remove the charging battery and launch immediately, or else you are just wasting the peak power.

The next step is shown in **Fig.7**. Here we have added a switch to the motor so that the motor no longer runs during

charging - the switch is open for charging and closed for flight. This means that we can plug the charger into the model, wait a while for the supercap to charge, unplug the charger then launch at leisure. Unlike the previous technique, with this circuit, the final charge voltage will now be equal to the battery voltage. If we use 2 x AA cells as the battery, then we will charge to 3V. This of course is above the 2.7V limit for the supercaps, however, it's 'probably' acceptable, but as I said earlier, "you are on your own."

The circuit shows a 1R resistor, which is optional. Without it, I measured peak charge currents in the 5 to 6A range. Granted this was only for a couple of seconds, but is close to the rated max current for the supercaps and also not being very kind to the batteries. These high currents only last for a few seconds and I did find some evidence to suggest that subjecting the batteries to them for just a few charges will degrade the battery and cause its open circuit voltage to fall.

Using a 1R resistor reduces the peak current to around 2A, but extends the charge time for a 10F capacitor to about 2 mins. For larger capacitors, then you could make this resistor 0.5R to reduce the charge time, but there is probably no point in going lower than this. The peak power in the resistor is very high (4W for 1R), but only for a short period of time, so you can get away with a 1W resistor here.

Stuart Sherlock had an interesting idea in the April 2017 Aeromodeller, when he used 2 NiMH batteries to give 2.4V. This is less than the 2.7V optimum, but seems to have worked for him. If using any kind of rechargeable battery in this way, I could consider the series resistor to be essential - the rechargeable batteries will have a very low internal impedance and you need something to limit the peak current.

Now I have a charger that I can plug into the model and just go away for a few minutes to leave it to charge. We can then remove the charger and fly at out leisure, no need to launch immediately, no motor running during charge. However it's charging to 3V not 2.7V.

What is really needed is something that will produce a constant voltage drop of about 0.3V between the charge battery and the supercaps. This would enable 2 x AA cells (3V) to charge the supercaps to 2.7V. Such a device exists, it's called a Schottky diode. In forward conduction, the voltage drop across these device is roughly speaking a constant, and in the 0.3V to 0.5V range, just what is needed. The circuit for a charger using this is shown in **Fig.8**. The LED and associated resistor do two jobs. One is to ensure that there is always some current flow in the diode and the other is to indicate charging progress. The LED won't light until the charge voltage exceeds 2V, and will then get brighter as the charge increases. The charging curve will look like **Fig.6**, but terminate about 0.3V lower. I have dropped the series resistor down to 0.5R, since the diode has some inbuilt resistance as well.

The component cost of this charger is very low, and it can be easily built up on a small piece of stripboard. Constructions details for this charger are given on the following pages. This represents a low cost, practical solution to reliable charging of a single supercap, and doesn't require more than some basic soldering skills to make one.

Using this type of charger, two more components are needed - the connector to plug it into the model, and the switch to use in the model. For the connector, I'm going to suggest a 3-pin JST XH type. This is the familiar 2.5mm pin spacing connector, commonly found on the balance lead in Lipo battery packs. The plug is on a lead from the model, tucked away inside for flight. Ready made balancing leads are easy to source, so you don't have to worry about crimping connectors. Why three pins? I'll explain later, for now I'm just using two of them, but you will need a 3-pin (2S) balance lead with one lead cut off. The charger can use the socket, it's shrouded so reduces the risk of the charger being accidentally shorted out.

We also need a lightweight switch in the model. A solution here is an idea I have pinched from Derek Knight - and that's to use a 2.5mm mono jack socket and plug. The socket is fitted to the

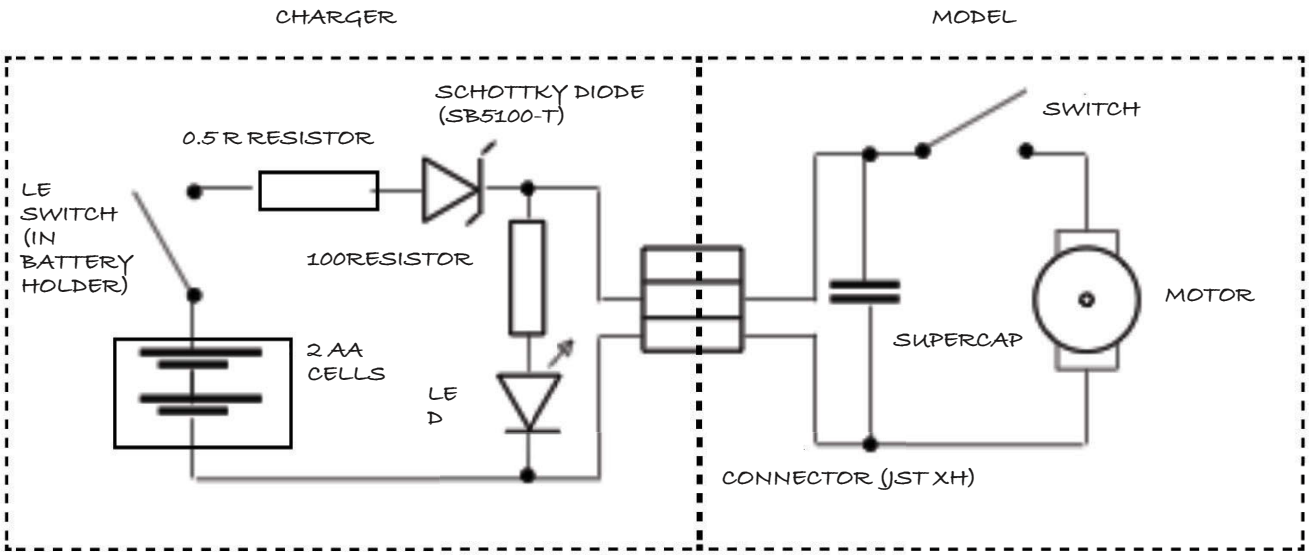


Fig. 8. 2.7V, LOW COST CHARGER. IT'S NOT DIFFICULT TO MAKE!

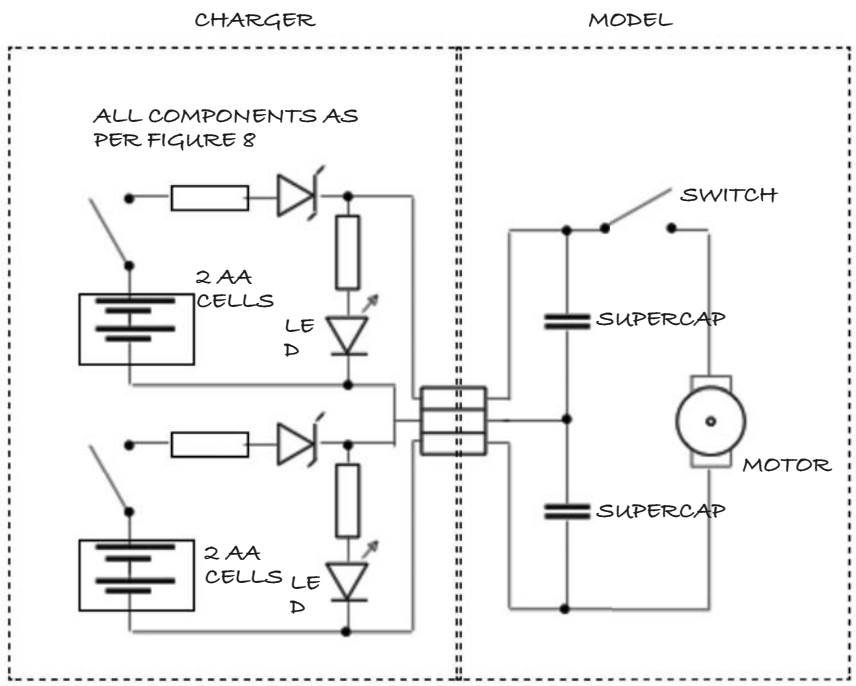


Fig. 9. CHARGER FOR SERIES CONNECTED SUPERCAPS

model and includes a pair of contacts that form a switch. With no plug inserted, the contacts are closed (i.e. motor running), but when a jack plug is inserted (there is nothing connected to the plug), the contacts are open. There are three contacts on the socket, to find which two to use, find the two that are connected together with no plug inserted. Put the plug in and they should no longer be connected. These are the two to use.

What I like about this idea is that the socket in the model is lightweight and its very clear what position the switch is in, if the plug is in place the switch is open and the model is safe. Also, there is no chance of the switch being accidentally knocked on. Do put a piece of ribbon on the plug, or else you WILL lose it in the grass at the flying field.

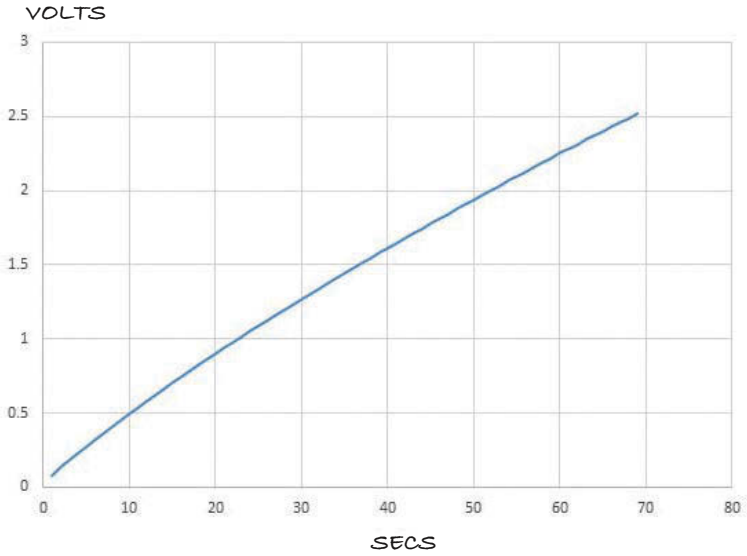
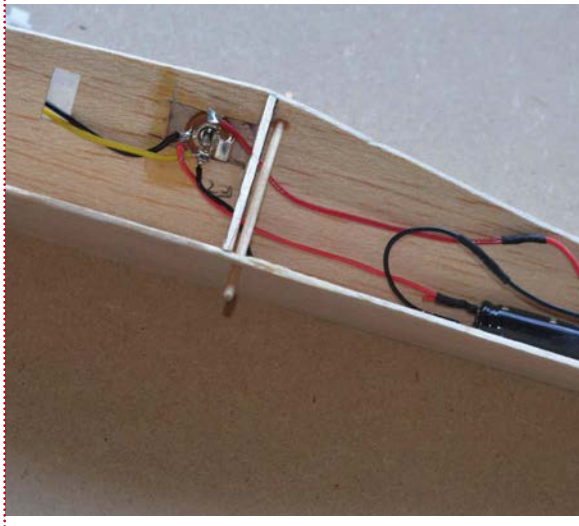


Fig. 10. CONSTANT CURRENT CHARGING GIVES A LINEAR VOLTAGE RISE AND NEEDS TO BE STOPPED WHEN THE TARGET VOLTAGE IS REACHED

One clear issue with all that has been discussed so far, is the fact that the thrust generated by the motor is limited by the voltage - 2.7V at the start and falling rapidly. Using a larger supercap, or two in parallel (same thing), won't help - you will get a longer run, but no more power. The answer is to use two supercaps connected in series, we now have a peak voltage of 5.4V to work with. The question is how do we go about charging this arrangement?

The obvious thing to do is simply to connect the two series connected supercaps across a battery, as we have been doing for a single supercap. There are two issues here. The first is that we require a battery of 5.4V, and this doesn't fit with any readily available battery technology. The other issue is that of charge balancing. The two supercaps will never be identical in all respects and you will probably find that one of them 'steals all the volts'. So although the total voltage is 5.4V, one supercap has say 3V across it and the other has 2.4V – i.e. one of them has overcharged.

There is a simple solution to charging two series connected supercaps, and this is shown in **Fig.9**. This is simply to charge them independently, using in effect, two of the chargers already discussed. Now the reason for the 3-pin connector becomes clear - we need access to the midpoint of the two supercaps. There is no issue with charge balance. One supercap may take longer to charge than the other, but they both charge to approximately the same voltage.



Model installation, in this case a Mark Bee's Honeypot(AM free plan) build for supercap power. Geared motor with GWS prop, 10F supercap, jack socket switch and JST charging lead

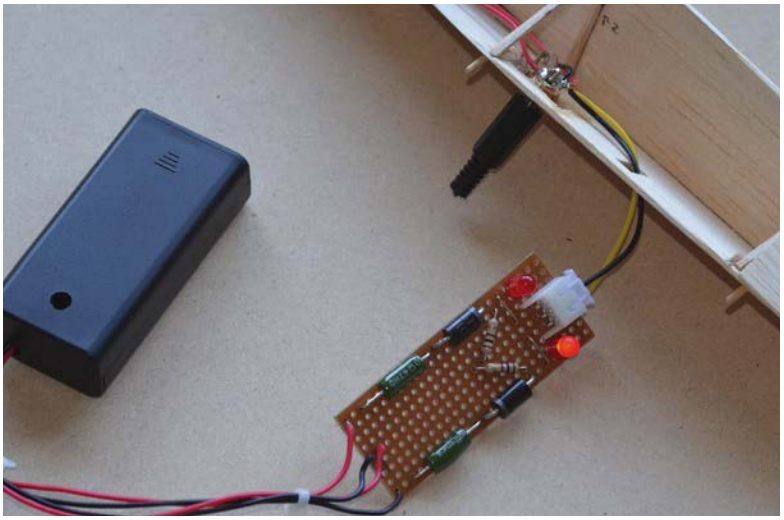
All of the charging techniques described so far have used a battery, this is very familiar and is an example of a voltage source. When a load (the supercap) is connected to a voltage source, it's the source that sets the voltage and the load that determines the current. However, there are also things called current sources. With a current source, the source determines the current and the load determines the voltage. If we use a current source to charge a supercap, then we have constant current charging, and the voltage across the supercap will rise in a linear manner as shown in **Fig.10**. This is very different to the exponential voltage rise that we get charging from a constant voltage (battery) source that we have seen before. The voltage, in fact, will continue to rise and we need a way to stop the charge when the target charge voltage has been reached. All of the previously discussed techniques are self-terminating.

Building a constant current charger does involve a degree of electronic knowledge and assembly skills and I'll admit that at this stage it may well be a step too far. My prototype charger is shown hereabouts. To make the constant current source, I have used a circuit called a Howland Current Pump. By all means Google this to see how it works, but you are likely just to get bogged down in the maths. I said that the charge needs to be stopped when the target charge voltage is reached, and to do this and generally control the charge, I have used a small computer board called a Microbit (check out www.microbit.org). In order to control the charging, this monitors the charge voltage ten times a second and stops the charge when the target voltage has been reached. The charger requires power which can be either 6 x AA cells or a 2S lithium battery,

Obviously all of this is a big step up in complexity from the simple ideas previously discussed, but a constant current charger does have several big advantages:

- Consistent and repeatable charging that's independent of the stage of the charging battery.
- The charging voltage is programmable in software, so its easy to change - mine has eight different charging options programmed in.
- It's very kind to the supercaps in that there are no large current spikes and no potential to overcharge the supercap. It charges at 1A with a taper to 0.1A towards the end of charge.
- It handles series-connected supercaps very well with no charge balance issues. The voltage across each of supercaps is monitored separately and the charge stopped when either of them reaches the target voltage.
- The charger monitors potential fault conditions (i.e flat battery, no supercap connected, taking too long to charge) and terminates the charge when detected.

As I said, all of this may be overkill, but does provide a platform for very consistent charging to enable me to do further work on using supercaps. The simple charger that I described earlier is quite adequate for now, if you just want to get out flying with supercaps and have some simple, low cost fun. ●



The Honeypot on charge showing the charger described in this article.

BUILDING A SIMPLE CHARGER

Bob Lee shows how to do it...

There are several approaches that I could have taken to design a simple supercap charger, but what I was looking for was something that would be easy to build, meaning that it didn't many components and those that it would be cheap, easy to buy and very importantly, easy to use. No soldering of surface mounted components with lots of legs that you can only just see. If you can use a soldering iron, you can build this charger.

To be clear, this charger doesn't deliver a regulated 2.7V, but a voltage that's 0.3V below that of the batteries in use. For this reason it's important to only use the correct batteries, 2 x AA, non-rechargeable cells in each half of the charger. It can be used to charge a single supercap, or two in series.

There are many ways to build it, in fact, you could just 'air wire' the components on the back of the JST socket, it would work, but not be very robust on the flying field. I suggest building on a small piece of stripboard for a reliable solution. You may have other ideas as well.

The schematic is shown in **Fig. 1**. has been redrawn from that in the previous article to make for a better layout on the stripboard, and also to put the components in a similar position to their stripboard positions.

You first need to get all the bits required. Ebay is actually a very good source for most of parts and often post-free. The descriptions given here should get you the right thing, but for those in any doubt, I have also supplied part numbers from RS Components where appropriate. You will find that you will have to buy most of the parts with a minimum order of 5 or 10 pieces, even so its not expensive. A small group of people getting together to make just 3 or 4 would make it very cost effective, probably about £5 each. To build just one would cost £10, or so.

So, you will need :

- Vero type Stripboard, 25 x 64mm. Get this from ebay - RS Components only sell much larger pieces.
- A switched battery holder AA x 2. Again, ebay. You need two of these if you are going to charge series supercaps.
- A JST XH socket, 3-way female. I used the right-angled version. Buy from ebay, or the RS part number is 820-1585.
- 2 or 4 x 0R47 1W resistor. Available from ebay, or RS part number is 485-1464 (actually this is a 3W part). If you want to reduce this to 0.5R to speed up the charge, then just connect two in parallel. You will then need 4 of these, but probably have to buy a pack of 5 or 10 anyway.
- 2 x 100R 0.5W resistor. Ebay, or RS part number 132-258. You will need 2 of these (but will have to buy 10.)
- 2 x SB5100. This is RS part number 751-4843, but they are half the price on ebay. You need 2, but have to buy a pack of 10.
- 2 x 5mm Red LED. Now this is where you may go wrong on ebay. Some LED's have a built-in resistor, and some don't. You need two without the resistor. It's not obvious on ebay which type you are looking at. RS part number 228 – 5972 gets you the correct thing. You need 2, but have to buy a pack of 5.
- A JST-XH balance lead 2S. Buy from ebay.

You will also need a few basic tools :-

- Soldering iron, 15W or 25W, with a fine pencil tip.
- Solder – I'm 'old school' and still use 60/40 multicore.
- Small long nosed pliers
- Small wire cutters

Fig. 1.

CIRCUIT DIAGRAM OF CHARGER

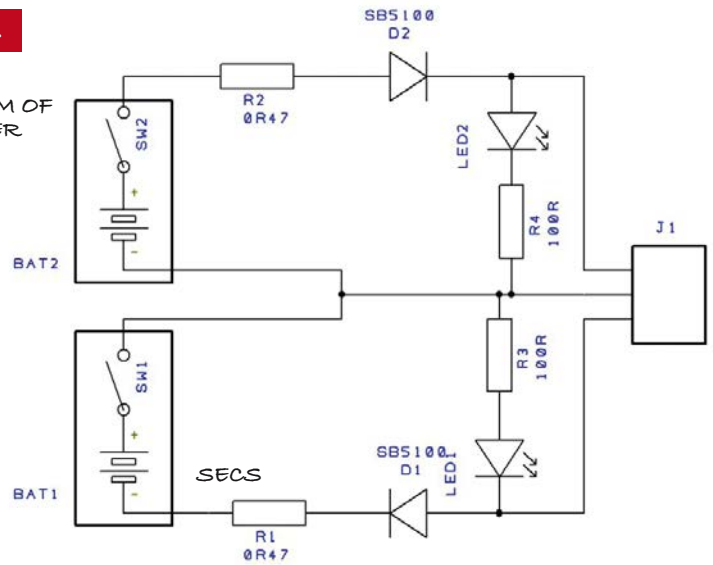
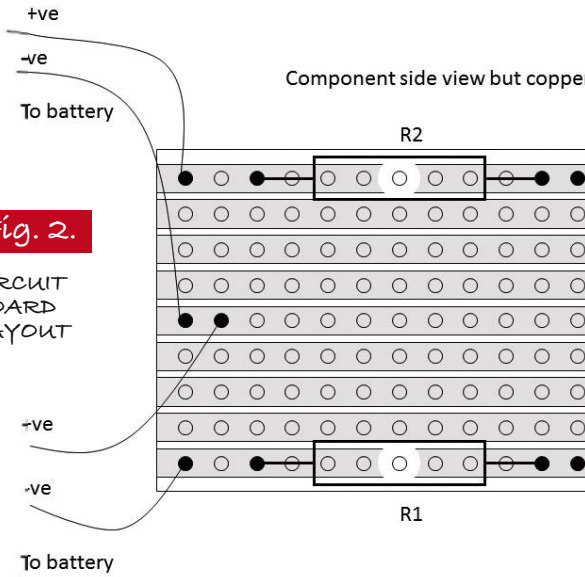


Fig. 2.

CIRCUIT BOARD LAYOUT



• 4mm(ish) drill and a 1.5mm drill
• Scalpel or craft knife
• A multimeter is very useful. Maplin sell one for £5.

The layout is shown in **Fig.2**. This is as seen from the component (non-copper side).

The components are inserted from the non-copper side. If you give the leads a little bend after insertion, then the components will be held in place for soldering. It goes without saying that all the solder joints should be bright and shiny. A dull finish indicates a 'dry joint' and poor contact. Take care not to short adjacent tracks with stray bits of solder. If in doubt, then run a knife blade between the tracks to clear out the gap. Trim the leads after soldering.

You need two wire links, use the offcuts from the resistor leads for these.

You need four breaks in the cooper tracks. Use the 4mm drill, held between your fingers to cut out just enough copper to form the break. If you aren't sure if it's a complete break, tease the edges with the knife blade. Only break the copper, don't go right through the board.

The diode and LED's have to be inserted the correct way around. The diodes have a band at one end, and yes, they are intended to point in opposite directions. The LED's are a bit trickier. One lead is a little bit longer than the other. They both point the same way.

The leads on the diodes are too thick to go through the holes, so drill the holes to 1.5mm from the copper side to avoid lifting the tracks. These thick leads will also soak up the heat from your iron, so take care to get good joints - but try not to overheat the diodes.

Now it's all built, but does it work? Don't connect any supercaps, but put the batteries in and turn it on. If both LED's light, then it's pretty certain that it's working, and you can go play with some supercaps. If not, then the carefully check the whole thing for obvious mistakes. If you don't find any, then check the voltage from the centre pin of the JST connector to each end-pin. It should be about 3V. If it isn't, then it's likely that either the diodes or the batteries are the wrong way round. If you do have 3V, then it's likely that the LED is the wrong way round. A reverse connection shouldn't damage anything. If you do need to remove a component, then solder wick is the stuff to use for de-soldering.

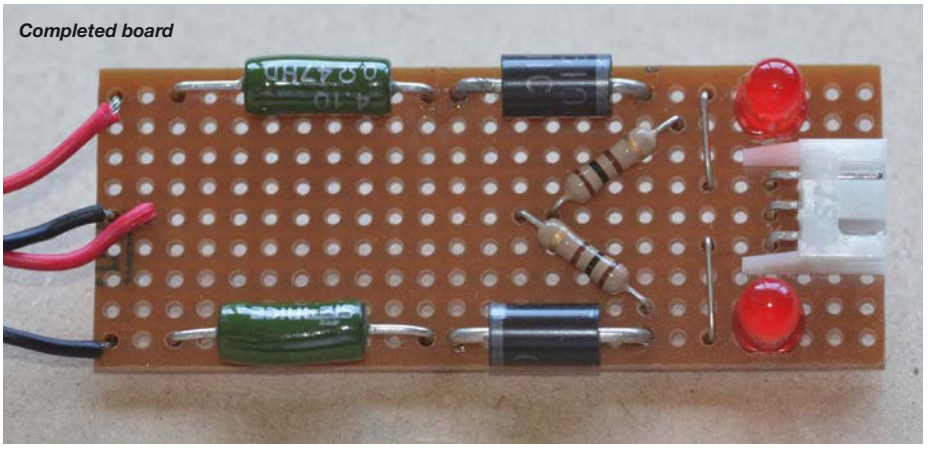
Fig. 3 shows the connections to the model with both a single supercap and series supercaps. Be careful with the polarities and be aware that depending on the colours used on your balance lead, they may not make sense. You may have a red wire to a negative connection or vice-versa, this can't be helped unless you make up your own leads.

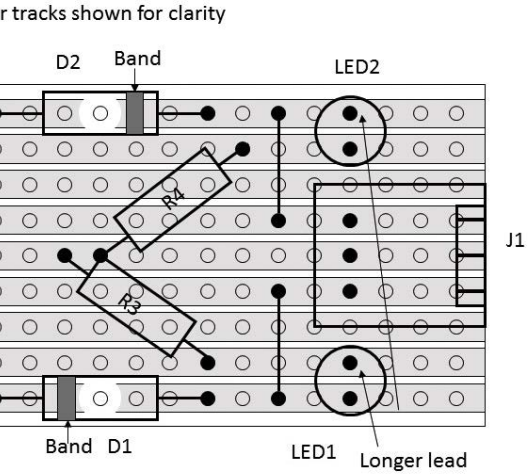
To use the charger, first ensure that the switch in the model is off. The charger plug it into the model and switch on the battery (or batteries). If the motor starts to run, you forgot the first step! After a short while, the LED(s) should start to glow and get slowly brighter. After a suitable time (see below), unplug the charger and then switch off the batteries, you are ready to fly. The reason for unplugging first is that otherwise you will lose a small amount of charge because the supercap will be powering the LED until the plug is removed.

These are the charge times that I measured. It doesn't matter if you leave it longer, so go away for a coffee, or a natter during some of the longer charge times.

10F	1 min
25F	3 min
50F	7 min

Completed board





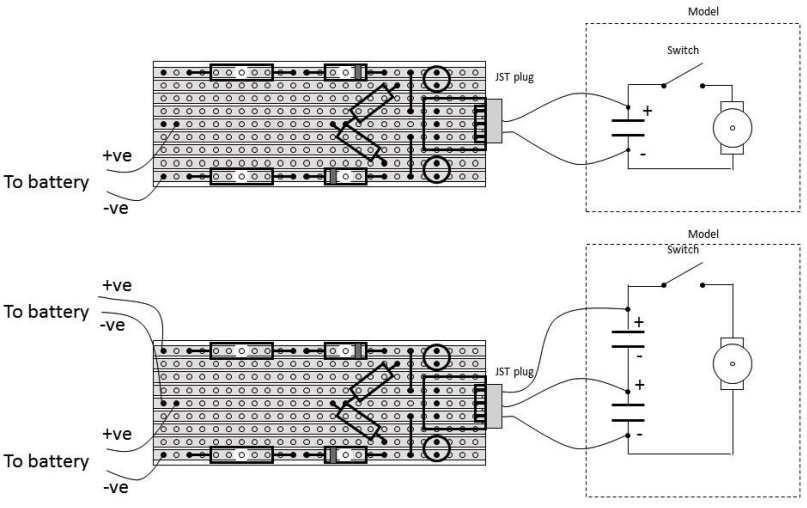


Fig. 3. CONNECTIONS TO THE MODEL, TAKE CARE TO GET ALL THE BATTERY AND SUPERCAPS POLARITIES CORRECT

Free Plan

Dave's two Dolphin prototypes at Old Warden, showing their stylish looks, simple build and easy motor access.

Dolphin CL Trainer

Dave Cowburn introduces a stylish stunt trainer for 149 diesels…

What's in a name? The brief for this model was to create an attractive and contemporary control line aircraft of a size that could be printed within the constraints of Aeromodeller centre pages. A built-up, rather than profile fuselage for appearance, be simple enough for most builders, yet interesting enough to have wide appeal. Much scanning of aircraft pictures and doodling resulted in a 'could be scale' outline with the lines of a modern light sporting aircraft - a key element being the large moulded canopy, with nearly every other part being straight lines, or single curvature. Why Dolphin? Well, when pulling the first 'pop-bottle' canopy moulding shrunk onto the 'plug', it reminded me of a bottle nosed dolphin.

All design is a matter of balancing compromises. The appearance of the model is highly dependant on the cockpit canopy, so it is probably best to start with this by carving a plug from straight grained pine then heat shrinking a poly-carbonate bottle onto it. If this proves to be a problem, then you can re-design the model to use an alternative top deck with a simple bubble canopy, or an open cockpit and 'fly-screen'. If you prefer it, just use the plan outline to make a profile fuselage – they fly just as well, and engine access is much easier.

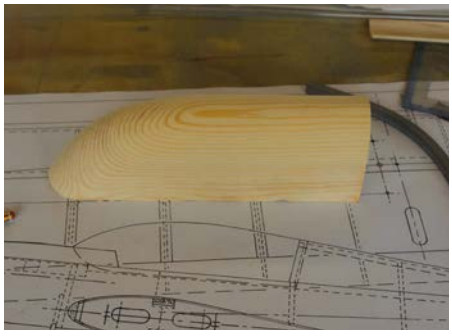
Another design compromise is the open underside to the engine and tank bay. While this simplifies construction, it makes access to the engine mounting bolts more difficult, the solution is to use captive nuts in the bearers and hold the engine with hexagon socket caphead machine screws (Allen screws). Because of this, it is best to start fuselage construction by making up an 'engine pod' of bearers and the UC former, with the engine mounting sorted out before the rest of the fuselage is built onto it.

Making a start

1: Carefully remove the centre pages and have them photo-copied, 100% for a 1.5cc model or 133% for a 2.5cc model. Have a few copies run off while you are

Canopy

Marking out the pine blank for moulding the canopy.



The mould, shaped and sanded smooth, ready to pull the canopy.

A large, clear plastic bottle is used to cover the mould, supported on its end, and a heat gun used gently to shrink the plastic down around the mould.

The bottle has been shrunk, ready to cut out the moulded canopy with plenty of overlap all round for final trimming on the model.

there, one to build on, one to use for templates and one to keep. Replace the pages in your favourite magazine!

Wing

• Lay the wing plan out and cover with transparent film. Set up the jigging for the spar (3mm x 6mm spruce for 1.5cc or 6mm x 6mm for 2.5cc) and trailing edge wedges, which have a taper angle of 9° to match the ribs.
• Shim up the spar by 1.6mm and secure the bottom TE to the jig.
• Lay out the inboard ribs over the plan to mark out the lead-out holes. Drill out the lead-out holes. Fit ribs to jig keeping square with off-cuts of angle, or set-square.
• Prepare bellcrank assembly of birch mounting plates (1.6mm for 1.5cc or 3mm for 2.5cc) and centre ribs packing the pivot bolt to keep the bellcrank central. Fit lead-outs and glue in the centre rib/bellcrank assembly, making sure that all is accurate and free-moving. Add the top spar. (50mm bellcrank for 1.5cc or 75mm for 2.5cc model.)
• When everything up to this stage is firm and glue set, add top TE sheeting and secondary LE.
• Fit approximately 25g tip weight between spars in outer wing bay and box in securely.
• Trim back secondary LE to fit top sheeting. Fit cap strips. Leave centre section sheeting at this stage for fitting of 14swg pushrod.
• Now remove the wing from jig to complete underside sheeting and cap-strips. Trim back sheeting and fit LE. Carve and sand to a good profile. Add tips and lead-out guides. Fit pushrod and centre section sheeting.

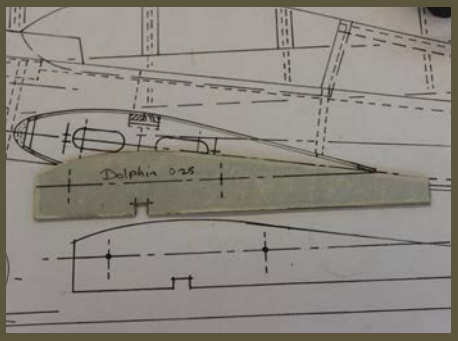
Fuselage

• Prepare the blanks for the sides by laminating ply, grain vertical, to the balsa (0.8mm for 1.5cc or 1.6mm for 2.5cc). Clamp between flat boards and set aside to dry.
• Make up UC former (3mm birch ply) and stitch/epoxy UC wire in place (12swg for 1.5cc or 10swg for 2.5cc).
• Prepare bearers and top ply plate (10mm square, plus 3mm alloy plate on 10mm x 12.5mm for 1.5cc ,or 12.5mm square, plus 3mm alloy or 12.5mm x 15mm for 2.5cc). Fit engine and captive nuts.
• Complete the pod assembly (remove engine) and add tank-retaining studding.
• Mark out fuselage sides noting the witness marks used to line up the rib template for cutting out the wing mounting.
• Fit sides to engine pod and add longerons to top edge of fuselage.
• Glue in F2 and over wing doublers. Add remaining 'lite-ply' formers (a cutting mat aids alignment).
• Fit wing. Again, a cutting mat and packing will aid true assembly. Replace the wedges, which were cut away to fit the wing, add bottom longerons and cross-grain bottom sheeting with tail skid sewn and glued to 1.6mm ply.
• Top of fuselage:- Fit top block over engine and tank bay, top formers ant rear decking planking with tapered strips cut from your pre-formed sheet. Add the rear block tail fairing with suitable packing held in place with small strips of double-sided tape, then sand to shape. Remove fairings and retain for fitting of tail assembly.

Tailplane and fin

• The rudder portion of the fin can be pre-formed to a slight curve to give an aerodynamic offset by wet moulding

Wing



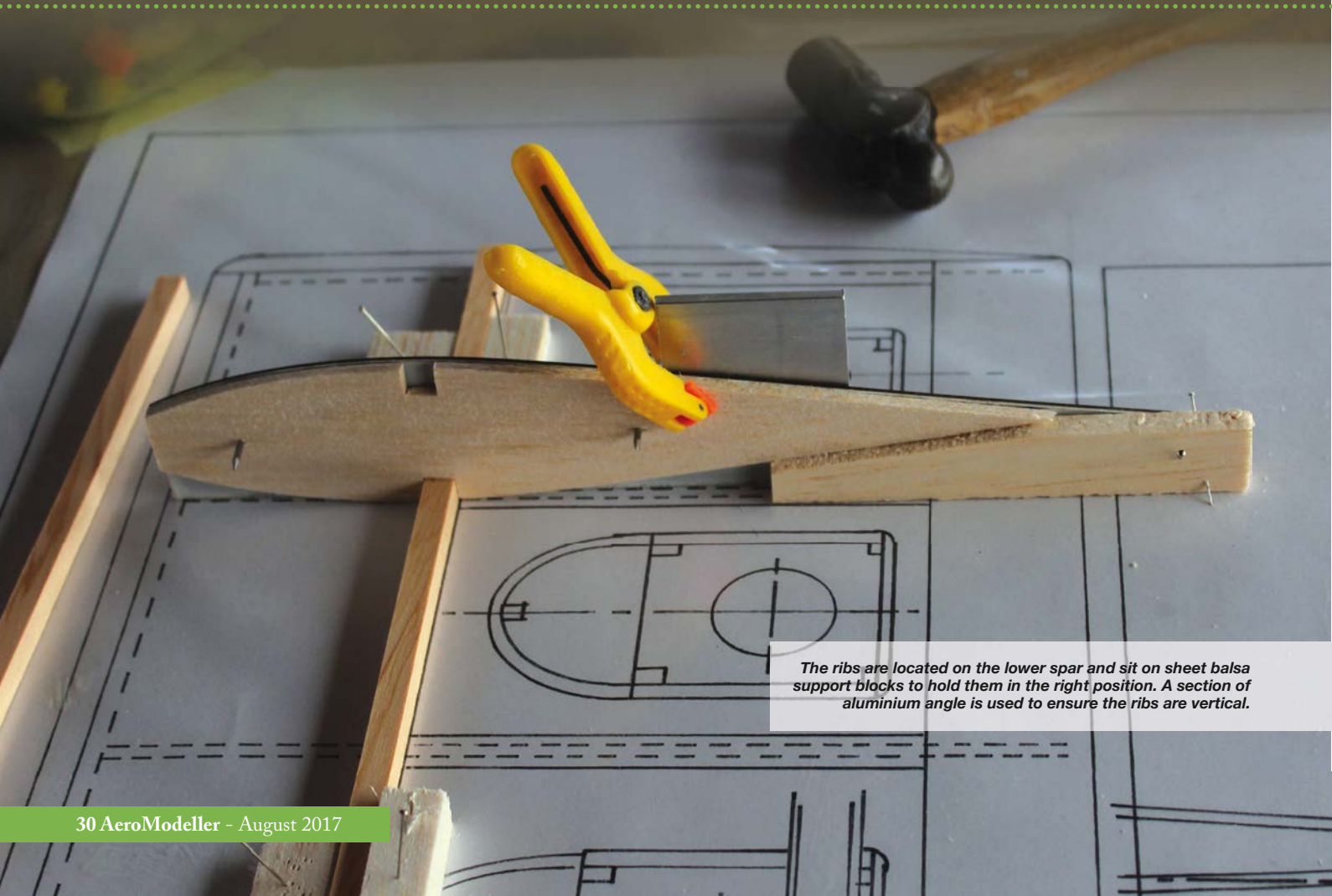
A rib template is made to cut out the parallel chord ribs (top side).

The rib blanks are then turned over and the template use to cut the lower rib outline.

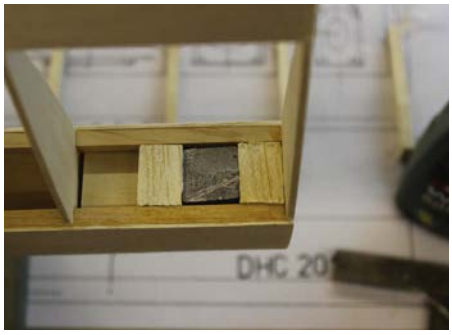
The lower TE strip is pinned in position and the ribs glued to the TE and lower spar. Note holes for leadouts and bellcrank in port side panel.

The bellcarank is sandwiched between two ply plates, packed either side to keep it located centrally.

The top spar, bellcrank assembly, top TE strip and LE are fitted and glued.



The ribs are located on the lower spar and sit on sheet balsa support blocks to hold them in the right position. A section of aluminium angle is used to ensure the ribs are vertical.



A tip weight is securely fitted between the spars and the end rib in the starboard panel.

After the wing LE sheeting has been fitted and the LE shaped, the wire push rod is fitted to the bellcrank and a sheet balsa plate fitted between the two centre ribs, with an exit slot.

onto the side of a large paint tin. The fin is just cut to shape.

- Tailplane and elevator are cut from sheet balsa (3mm for 1.5cc or 5mm for 2.5cc) then the LE and hinge line are radiused, leaving the TE of the elevator square.
- Pre-dope and tissue cover the hinge line, this makes the fitting of the tape hinges easier and aids later finishing. Fit the tape hinges, which can be fixed with dope and add the ply plates for the horn mounting.
- Fit the tailplane, fin, rudder and tail fairing. The rudder is sandwiched between the fairing blocks, but the fin is just a butt-joint to the fuselage top decking. This joint can be reinforced with strips of fabric doped into the corners.
- Connect up the pushrod, taking care to ensure a true neutral and equal up and down movement.

Fitting the canopy

The canopy is a key feature of this model and it is worth taking some care with its fitting. After the model has been pre-finished, that is, bare wood doped and tissued, the canopy moulding should be trimmed to fit with an overlap of about 5mm to rear and bottom edges. You may find tin-snips best for this, as although the polycarbonate moulding may seem rather flimsy, it is quit tough. With a good dry fit, mark round the edges of the canopy, then remove it so that the inside of the cockpit can be finished.

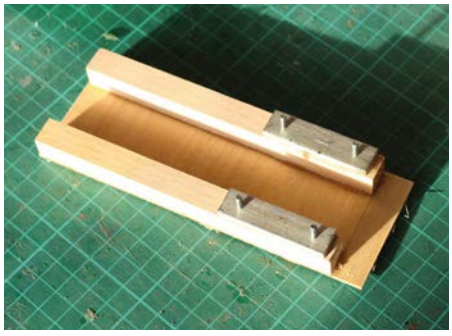
Now fix the canopy in place with 'canopy glue' and hold with masking tape until set. Mask off a line a few millimetres up from the edge so that a fillet of fabric and tissue can be built up overlapping the canopy edge and blending into the fuselage, then continue to build up the clear dope finish ready for final paint, trim and fuel-proofer.

The wing of the smaller model was covered in heavyweight tissue, the larger version with polyester lining material (local chain store haberdashery department).

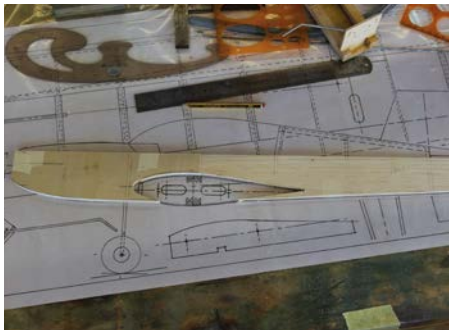
Finish

The prototypes were finished in a

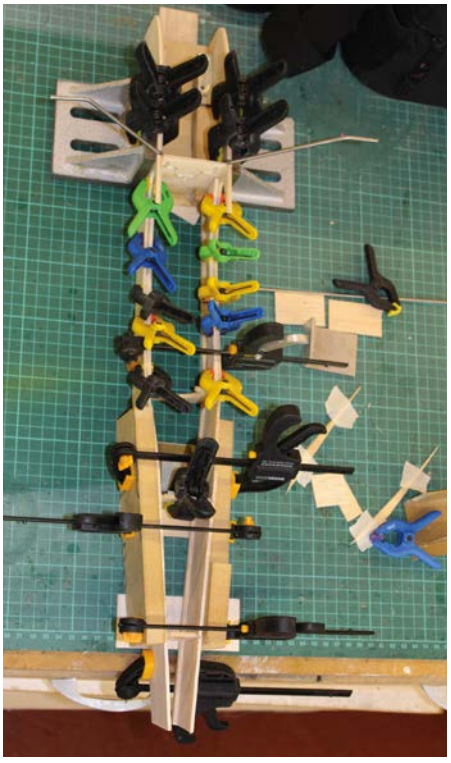
Fuselage



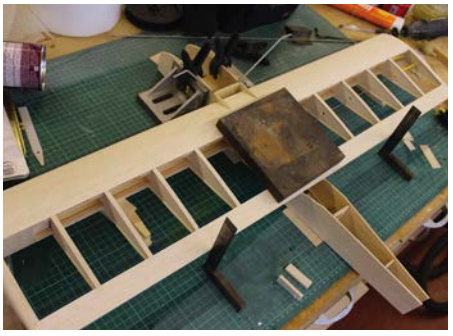
The engine mounting 'pod' is assembled from a lite play plate and hardwood bearers, and aluminium motor mounting plates.



Two handed fuselage sides are cut out and ply doublers fitted. Note the accurate wing cut-out. Allowing the wing to be slid into position at a later stage.



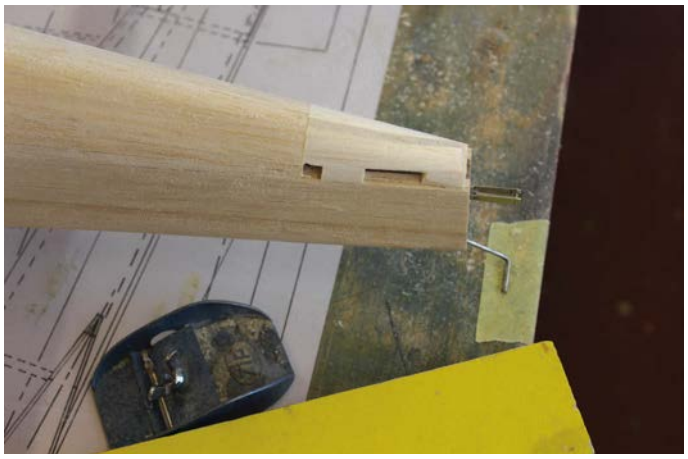
Dave uses a build jig and multiple clamps to accurately align the fuselage sides when the fuselage formers and engine 'pod' are fitted. Note that the UC wire has already been attached to the front former.



The wing is slid into position and glued. Note the cutting mat grids allow accurate alignment to ensure the wing fit is true.

The top formers have been fitted aft of the cockpit and balsa strip used to form the top decking.

Fuselage



The rear tail fairings are sanded to profile on packers equal to the tailplane thickness.

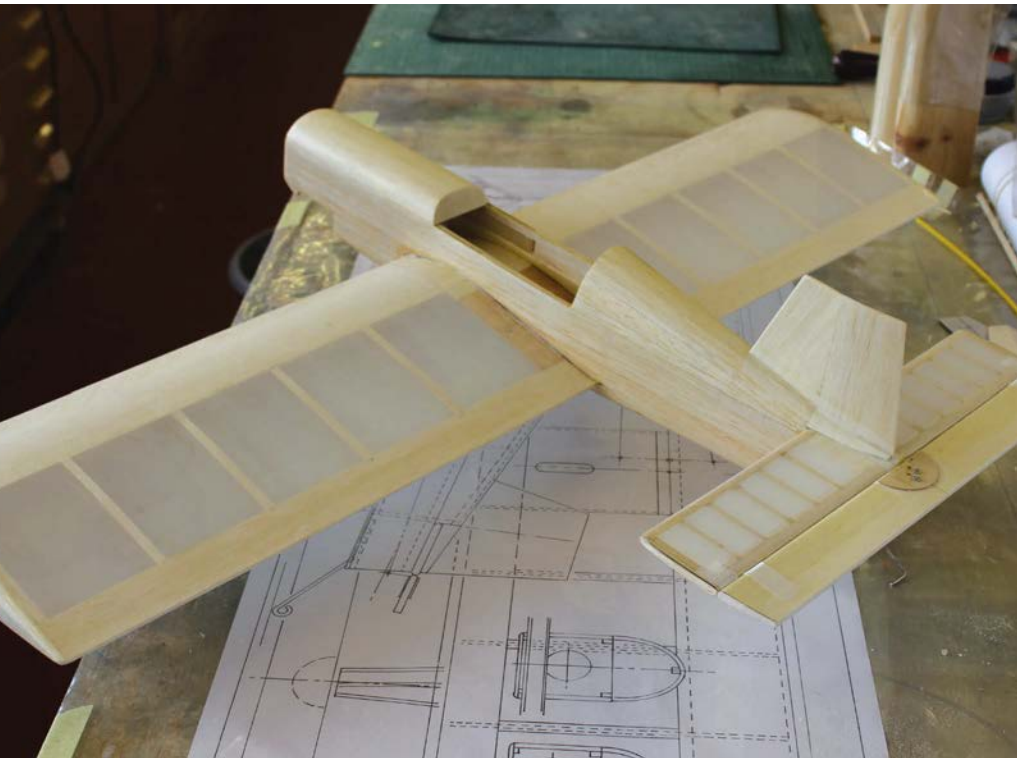
Final shaping of the front top decking and nose block. Note the taped on, oversize trimmed canopy.

traditional manner, tissue, fabric and dope. Lightweight tissue on bare wood, heavyweight tissue on the wing of small model and polyester lining material on the wing of larger model. Several coats of clear dope followed by aerosol spray colour, transfers and trim, then fuel proofer.

Polyester lining material was obtained from the haberdashery department of a local store and is available in a wide range of colours. It is easy to use, light and strong. Fix in place with heat sensitive fabric adhesive, iron set to 'silk', then shrink out any wrinkles with iron set to 'wool ', rather like 'Solartex'. It is then doped just as you would tissue or nylon 'in the old days'.

Dolphin is easy to fly and mildly aerobatic, you won't compete with the F2B flyers, of course, but loops, eights, wingovers and inverted are all possible making it a very pleasant sport model. ●

Fuselage

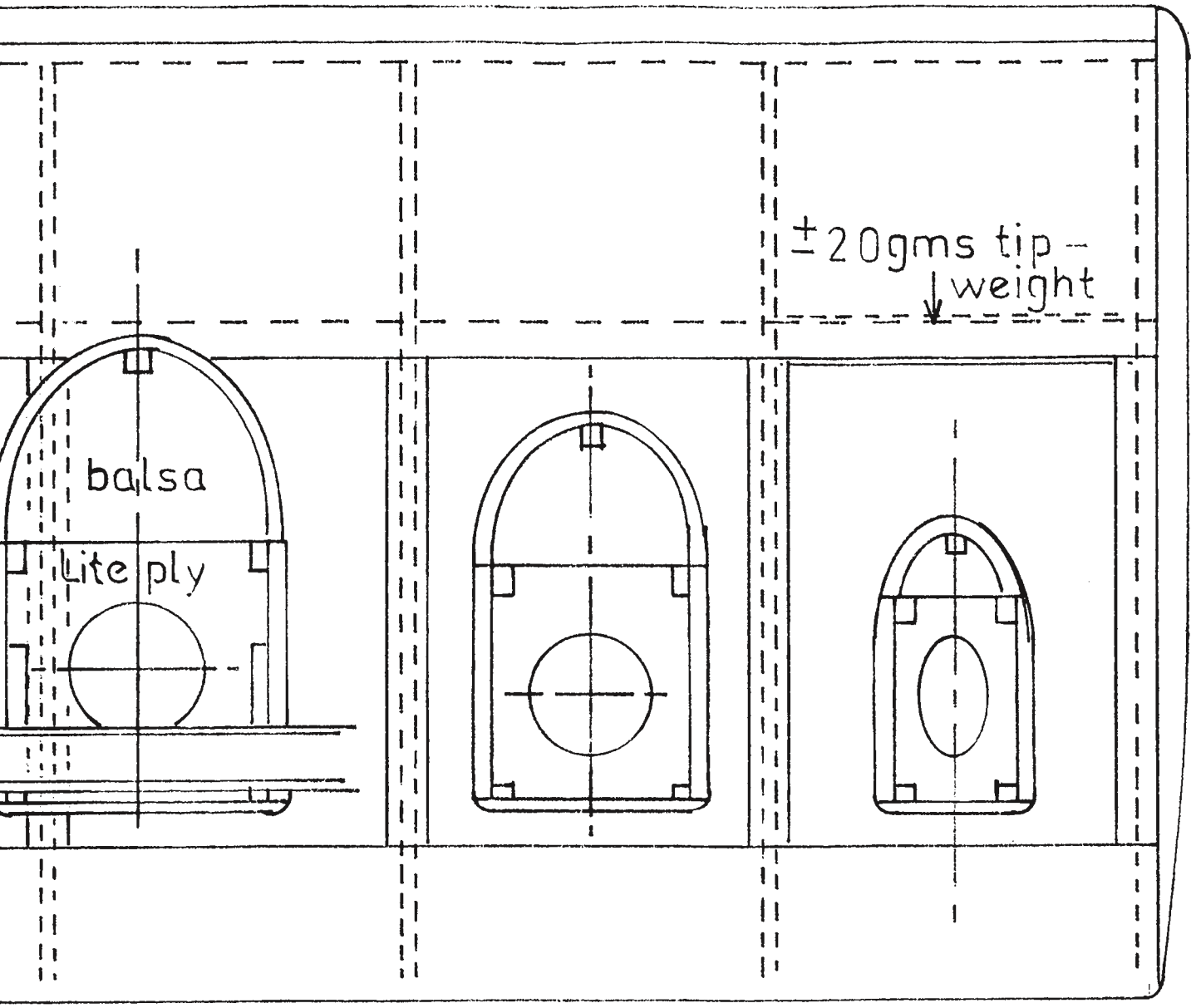


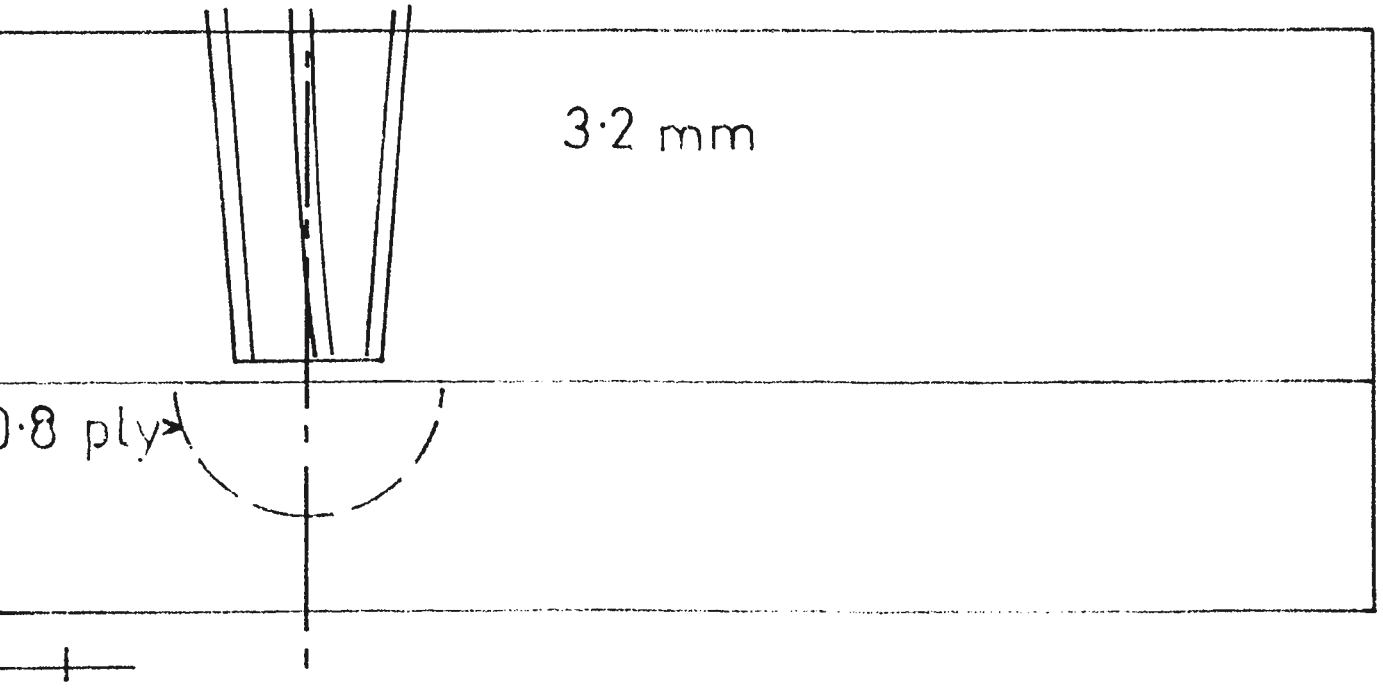
Covered and doped (note the splendid surface 'sheen', ready for final painting.

The underside of the nose, less the engine and tank, showing the tank-retaining bolt and drilled out engine mounting plates.

Detail of the tank that Dave used in the larger model showing vent and feed pipes and the tube guide for the retaining bolt.

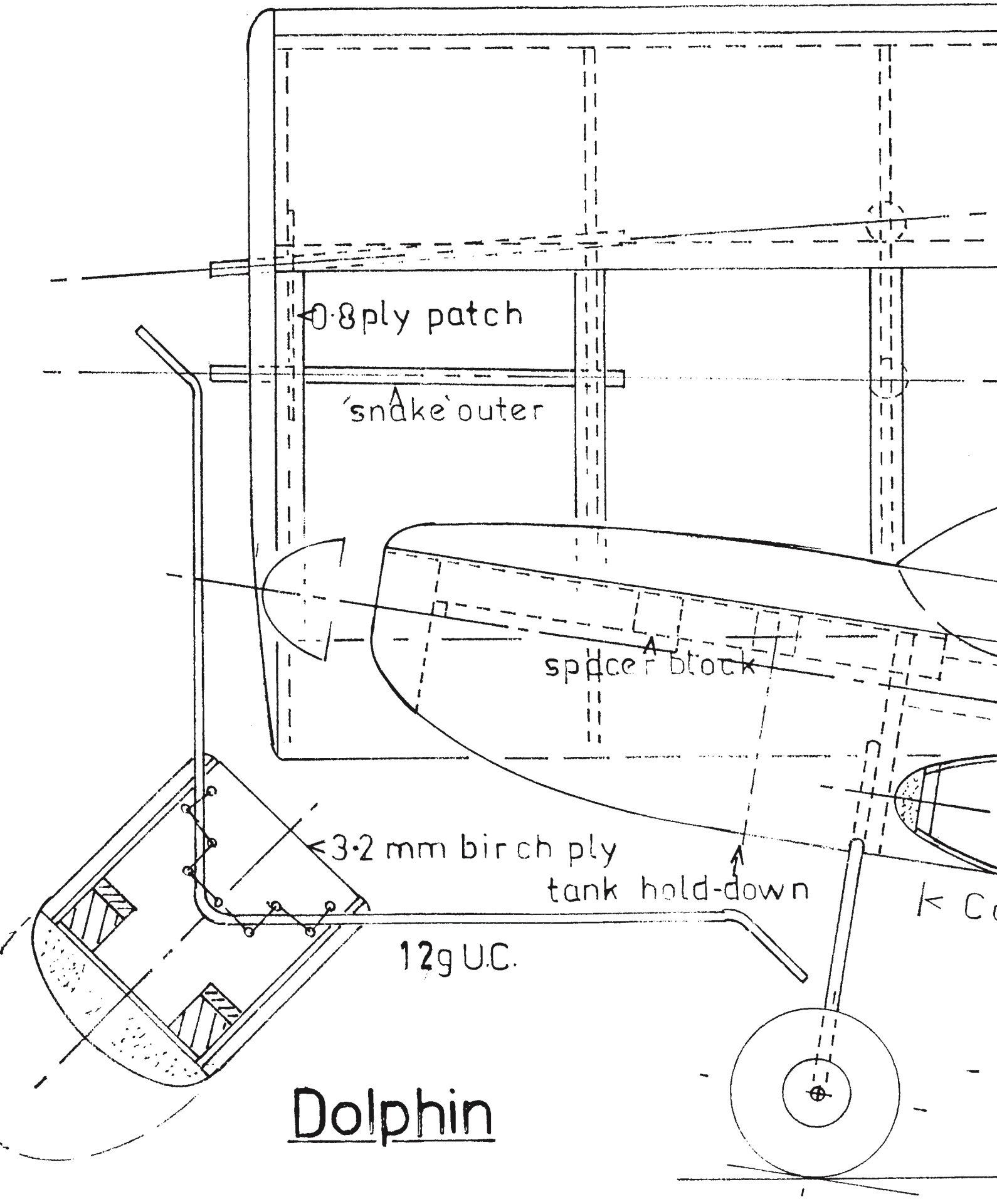
Dolphin - 26.5" span CL Stunt Trainer for 1.5cc. Designed by David Cowburn. (Enlarge 133% for 2.5cc)



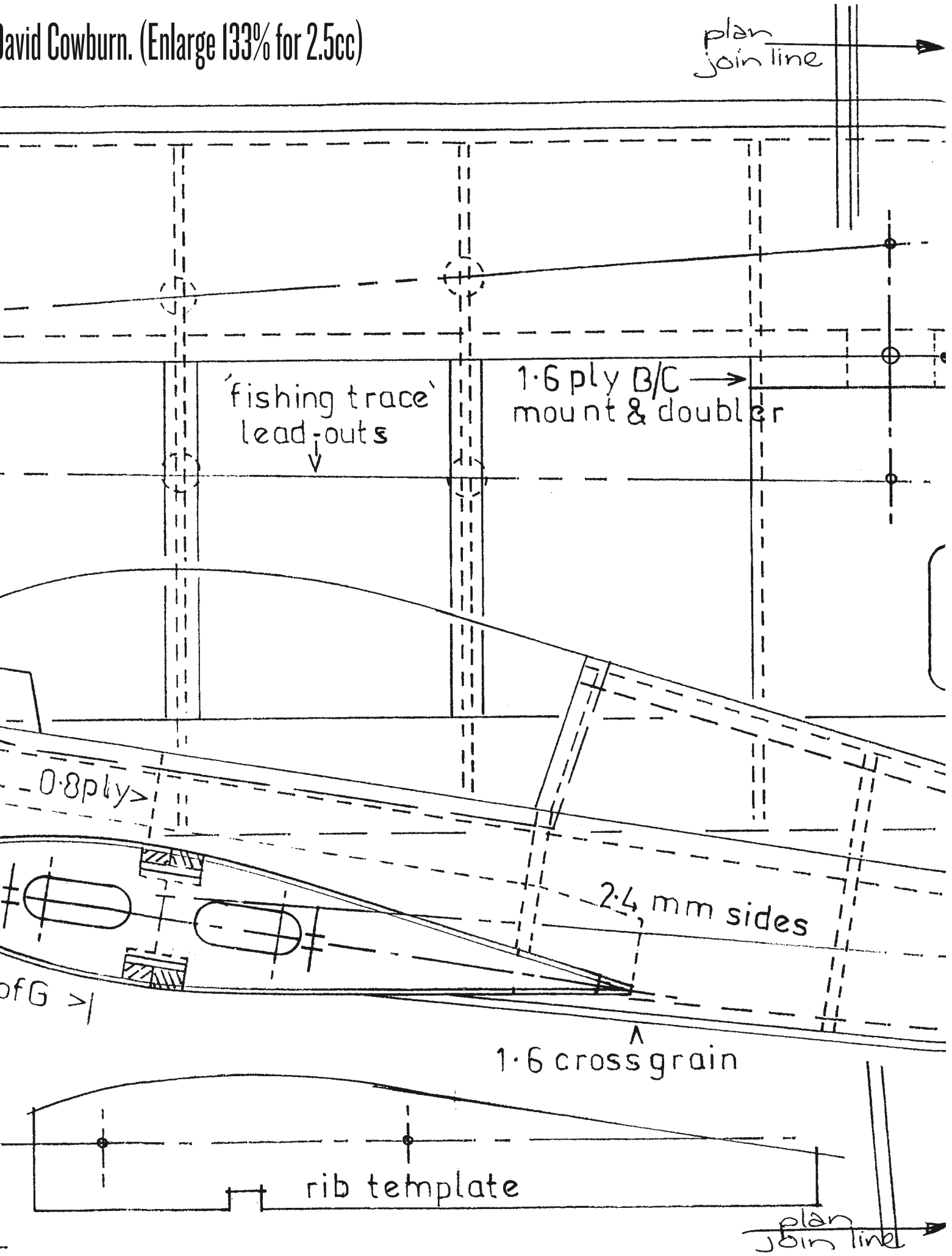


FREE PLAN - FW190T 'TRUDI' FANTASY SCALE EDF
PLAN 634 IN AEROMODELLER 963 AUGUST 2017

Dolphin - 26.5" span CL Stunt Trainer for 1.5cc. Designed by D



David Cowburn. (Enlarge 133% for 2.5cc)



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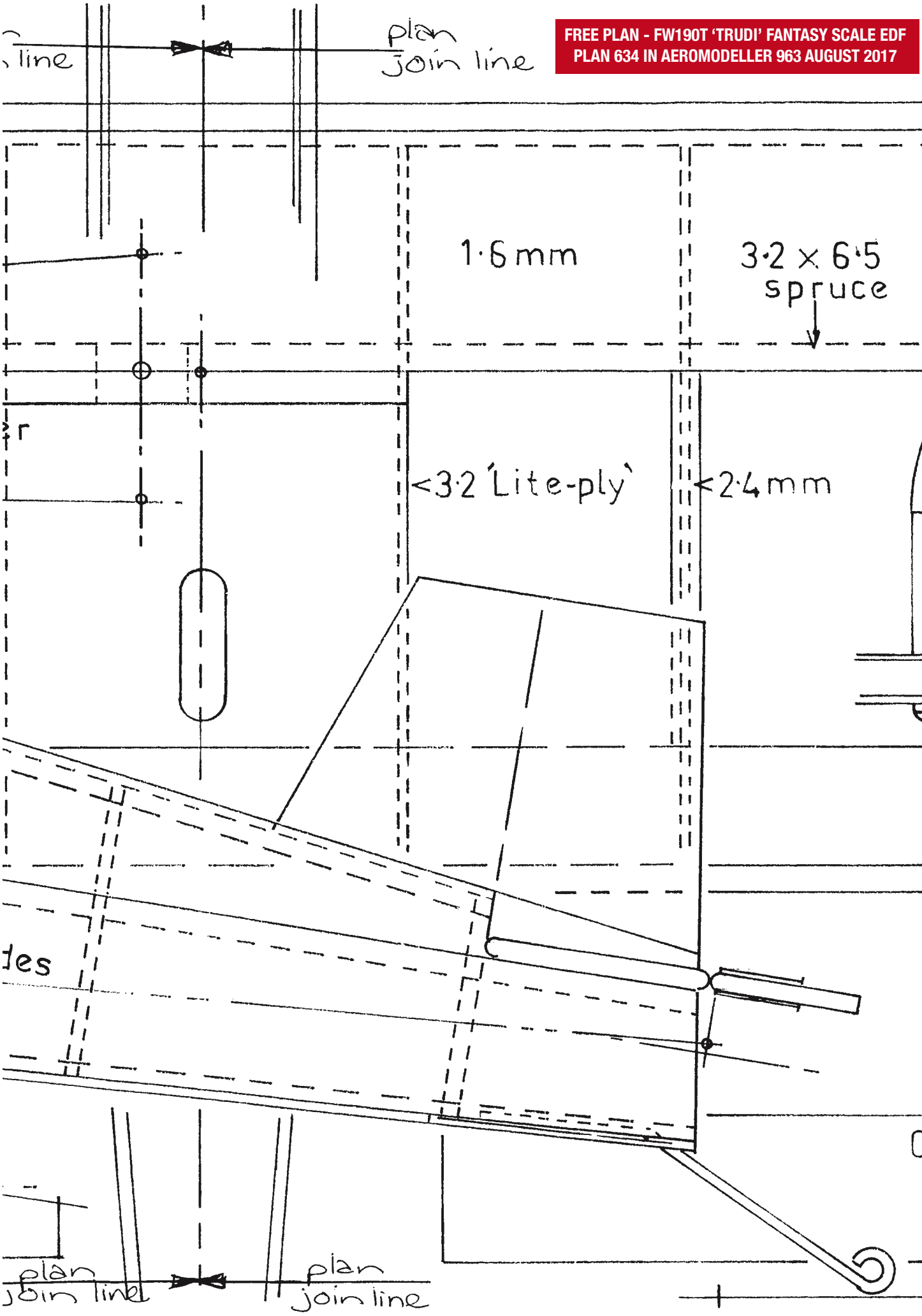
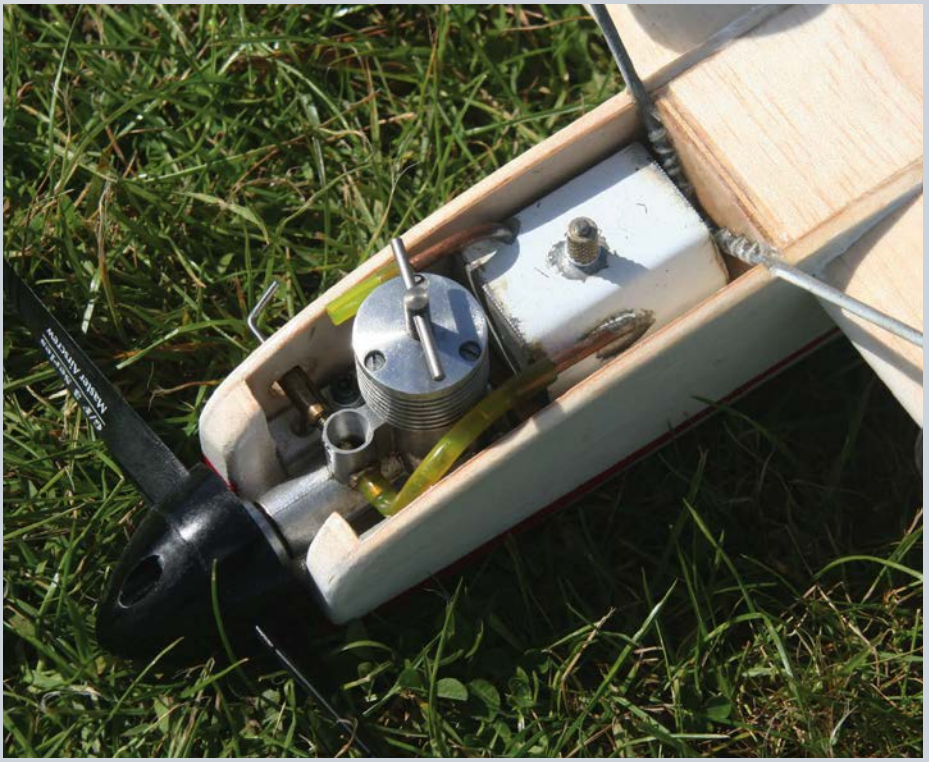


View from inside the circle – the Dolphin (this is the larger model) is a smooth flyer that performs simple aerobatics with ease.

The 2.5cc glow motor fitted in the larger model with rebate in the inboard fuselage side to clear the silencer.

Detail of the tailskid and the elevator pushrod horn used.



Installation of the 149 diesel fitted in the smaller model.

"The time has come," the Wizard said, "To talk of many things: Of engines, ether and gas-seals, Of diesels and Dykes rings...

(apologies to Lewis Carroll)

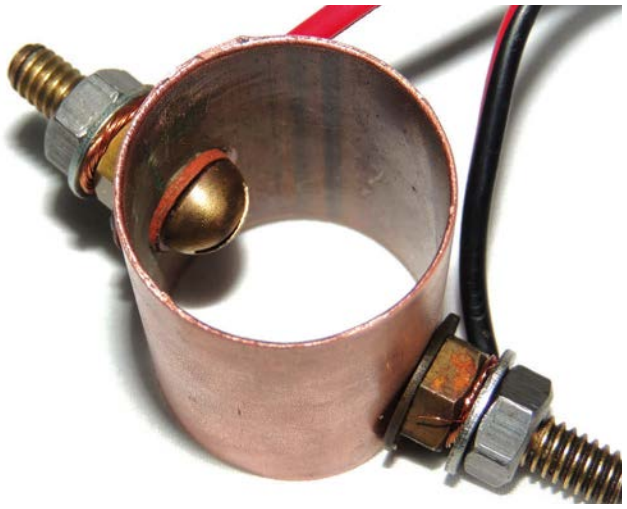
PART 5 - CYLINDER HEATERS AND DIESEL FUELS

Brian Winch gives an account of his love of diesels and how to convert various glow engines to compression ignition.

This last experiment was for modellers in really cold areas, when flicking a diesel into life can be a bit of a bother. There could be merit in the idea if you want to experiment but, really, if you want a cylinder pre-heater, get the cigarette lighter from your car (or buy one if it doesn't have one fitted) and make

My electric heater for diesel engines and the cigarette lighter that does the heating.

The top bolt is for the lighter body contact but you must experiment with dimensions.



Fully insulate the lower bolt (1/4" round heads) from the body. The plug element contacts here, but again, spacing is important to prevent a short circuit. Plan carefully and carry out tests.

Commercial cigarette lighter sockets can also be obtained with all metal construction and both of these have potential for converting to a diesel heater.

A bit of adaptation by removing the base and setting up a side contact would not require rocket science.

up the cylinder heater in my photo. It is a piece of copper tube (that will fit the engine cylinder), split down its length if you are going to use it for other engines of a similar size, and two brass roundhead bolts (I used ¼" Whitworth, as I had them) in the side to connect with the heater (suitably spaced for the terminal distance). Connect a 12V battery to the terminal cables, push the heater body down to expose the element end (as they do normally in a lighter socket), insert it into the heat tube so the outer body contacts the top bolt and the exposed element end touches the bottom bolt. It will glow red-hot. Leave it for a few seconds (probably 10 maximum), slide the heater off and the engine will be more than happy to start, as it will be hot and happy.

Experiment with the length of the tube and the bolt contacts as, with a bit of careful measuring and planning, you can have the lighter work the same as in a lighter socket - the diameter of the tube will stop the rim of the lighter from entering and the inner section (the heat coil) will continue down to contact the next bolt head.

THE BOTTOM LINE

As I said - all good fun with experimental projects and a very good learning curve but…the bottom line is simple. A brass contra piston in a modified, or purpose made, cylinder head is a proven method that works extremely well. A cast iron contra piston that is a super tight fit in the top of the liner and a slip fit in a modified head, or purpose made, head is also excellent and…the cold piston and (in this case) warmed up liner is the way to go to get the bits together. An 'O' ring sealed contra piston works very well, but requires a fair bit of careful calculation and fine machining to obtain a very tight fit which is very necessary and - you have to be able to access the suitable 'O' rings.

To maintain a long-lasting thread fit for the vernier adjuster (Tommy bar), remember the glow plug act or, another method that works extremely well, is to fit a thread coil from the start. These coils (several brands available such as Helicoil, Power Lock, Re-Coil) are commonly stainless steel wire (phosphor bronze is also available for special applications), wound into a threaded hole and once in, that's where they stay. Even with a specially designed tool, they are very difficult to remove. A head fitted with a thread coil will outlast the engine and they are excellent for repairing worn

One of my several thread repair kits. This one is for damaged glow plug threads. The tools in the tin (RHS) are for facing the repaired plug hole, to ensure it is at 90º to the threaded hole. The cutter is a socket head screw, teeth cut into the head and then hardened.

thread holes. Yes, they are available for all common thread types, even BA.

THE SCIENCE OF HOME-BREWED FUEL.

Well, really, is it a science or an experiment? Maybe a 'secret' mix handed down from father to son, or a replacement for the elusive Mills Diesel fuel formula. My first encounter with my Frog 100 diesel had me using the one and only Mills Diesel Fuel, mainly because it was on the advice of the shop assistant who sold me the engine. Later on, when it was difficult for me to obtain the Mills fuel, I learnt about the famous 'jungle juice' - equal parts kerosene (paraffin), castor oil and ether. All the ingredients were easy enough to come by in those early days, as long as you had a couple of 'bob' (shillings) in your pocket but, that was not always the case, as 'bobs in pockets' was not too common in the early days after WW2, so every penny was counted carefully (and used even more carefully) and the few pennies I garnered mainly went to buy the ether content for the fuel. This was because ether was not a common commodity in households, whereas as almost everybody had kerosene on hand, and there was always a bottle of the dreaded castor oil in the medicine cabinet. When I had used up (on the quiet) all the medicinal castor oil from the medicine cabinet, I resorted to trying other oils that I found in my father's workshop, or from my uncle's leaky motorcycle, which used a lot of oil (it was affectionately called a 'diesel), so there were always oil containers around with enough dregs to make up a drop or two of fuel.

Not a great deal has changed over the years - I still like to experiment with fuels - mainly lubricants, but I no longer use castor oil for any fuels. The only use I now have for it is a plasticiser in some

My poor suffering little DC just keeps coming back for more. Heaven knows how many hours it has on the clock. It has had hundreds of starts and, probably, most of them have been with an electric finger but…it is still all original and working.

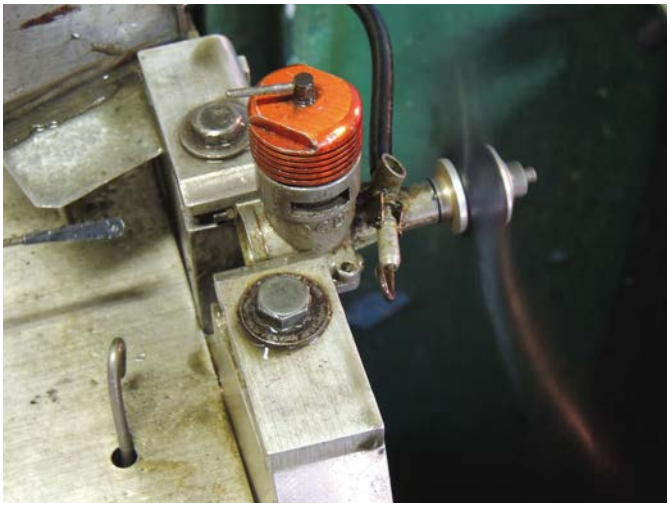
paints, and I use a castor-based grease for the cam assembly in 4-stroke engines after I have serviced them, as I know this is miscible with methanol fuel. Other than that - not a drop, thank you - and glad to get rid of it. As I discussed with you a while back in my article about fuels and lubricants, there are several excellent synthetic oils available and I have used al of these in a great range of diesel engines with excellent results and no deleterious effects - certainly not accelerated wear, as is often touted. Just for interest, my Mills fuel substitute is equal parts upper cylinder lubricant (for car engines, etc. Redex is one), kerosene and ether and it is, for me, as good as the original.

Now, ether is a problem to obtain in many places, and we can thank the obnoxious illegal drug manufacturers for that, as it is used in the manufacture of one of the worst drugs. Walk (as a stranger) into some chemist's shops, ask for ether and there is a fair chance you will be explaining your need to a Police officer or two after the chemist has alerted them to your request. There is generally a member of a free flight or control line club who can supply ether, but this might not be convenient for some modellers. One method of obtaining it is to purchase a starter fluid such as 'Start Ya Bastard' that is used for assisting in the starting of large diesels, tractors, or any other internal combustion engine that is a bit reticent to start by ordinary means. The ether content is listed on the container label, so calculate this and work it into your fuel formula with the rest of the ingredients as part of the kerosene content.

Every so often, an etherless formula crops up for running diesels. I have tried a few with mixed results (but I now have a couple that work extremely well) and I have also run an engine quite well on kerosene and oil mix after starting it and letting it heat right up on an ether-based fuel. I saw Gordon Burford (manufacturer of Taipan, etc) engines in Australia) run a diesel on cooking oil in much the same way, but this is not for every flying day use.

NOT ON, OLD CHAP

I am more than well aware of traditions and 'how things must be done', but I refuse to be a Luddite - stick in the mud - abject follower. Really, I don't give a monkey's if somebody is offended by my not sticking to tradition. Why must things be done 'that way' or the 'right' way, when there is a better or modern alternative? It's a bit like castor oil. I don't use it - don't like it - don't advise it - as there are so many reasons to not use it and we have such superb modern synthetic oils available these days. I use only synthetic oils, and my engines don't suffer or prematurely wear out plus, they don't gum, or varnish, or even carbon up. You want to use castor - go for it - your choice, but don't harass and harangue me about my choice. Now, it's much the same thing for electric starters. I have seen some modellers turn green around the gills when an electric starter is suggested for starting diesel engines. One 'character' came right out and told me, "you can't do that - the engine must be flick-started". Why? When I carry out test reviews of engines, I almost always flick start the engines as I enjoy doing it but, if I have a long session of engine starting (as I will cover in a moment) I am going to use, in the main, an electric starter. Several reasons - the engines start more readily, it saves a lot of time and I don't spend the next day whining to my poor dear suffering wife about my stiff right shoulder. Heavens knows how many times I have flicked a propeller in 70 years of model engine starting and running. I have reviewed a bit over 350 engines for test reports and that alone represents a lot of flicking! Sensibly, I see and know of no reason whatsoever why an 'electric finger' cannot be used to start a diesel engine. I know, I know - hydraulic lock - I have heard it a million times. Fact is, almost any engine can suffer from an hydraulic lock and one of the worst offenders is the methanol radial engines - the lower cylinders are very prone to it, However, like anything else, it is a matter of education. Learn how to use a starter and the correct starter for the job. I have a monster starter that would turn over a motorcycle engine if needed but, sure as hell, I am not going to use that on a small model engine. The common field type electric starters, Sullivan being a fine example, would certainly be ideal for a say, 4 to 10cc diesel, but probably not for a 0.5cc. There are small starters that are designed for small engines and, conversely, big starters for big engines and also one in the middle so - use a starter applicable. As to causing a problem with an hydraulic lock - it is something to be considered



Note the colour of the exhaust efflux - clear oil. No black goo from my fuels.

Shellite and kerosene off the shop shelf - nothing special.

Very accurate cooking thermometer. The fine tip point is the sensor zone - ideal for engine temperature testing and reasonably safe to use.

Easy to see readout is held until you change it, or switch the sensor off.

with ANY engine you are about to start, and the simple procedure is, wind the propeller over, then give it a couple of flicks - THEN apply the starter. Over the last three days before finishing this article, I started my poor suffering little DC 1.5cc diesel close to - maybe more than, 100 times testing a great range of different fuel formulae. I flick started it a few times, but the majority of times I used my small size (geared) electric finger and guess what? The little DC is still mounted on my test bench and I guarantee I could go out now, fuel it up and it would be off running again just as it has for heaven knows how many hours now in its long-suffering existence.

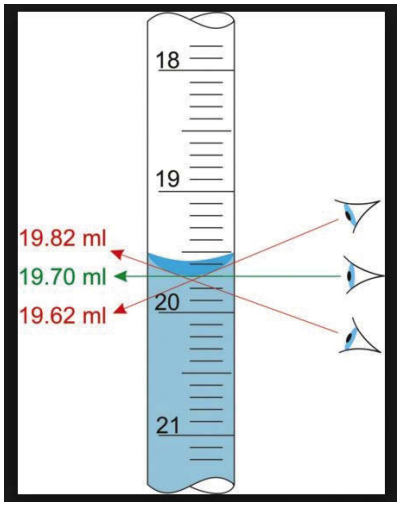
I suppose you now want to know about the fuel formulae and what it was all about.

Well, I was expanding my testing to find a suitable etherless fuel and the value of adding a particular improver, which, I have used before for a very good result, but I did not record any information at the time. As to the etherless fuel, many readers will be aware that you can no longer purchase a pound bottle from the chemist - or - if you can from a friendly chemist, it will cost you a serious amount more than we might be considering. As I said, ether is used by manufacturers of illicit drugs, so its availability is limited. Strange thing is, the drug brewers seem to be able to buy great amounts of it – so where do they get their supplies? Anyway, the fact it, ether is not readily available unless you know a legitimate supplier within the circle of modellers with whom you mingle. You can tap it from a can of engine starter such as the 'Start Ya Bastard', as I mentioned earlier, but it would be so much easier if we didn't have to use it at all. I can now tell you that I have been extremely successful with my research as I have several etherless formulae and several very low-content ether fuels. Now, as I said at the start of this bit, a starter (electric finger) does help as you need to build up the cylinder temperature for an easy start. You can also consider my 12 volt diesel heater (actually the idea came from a UK modeller many years back to me but - I no longer have his details) and the other method, ideal for simple conversions, is to use the Gadget, as this will get things going quick smart.

Contents listing of 'Start Ya Bastard' showing the ether content.

Regular contact, Barry Lennox (by Email), sent me a copy of a fuel formula he had sent to him from Bill Maunder, that looked to be a good brew, but I had a little problem with one ingredient listed as 'Fuel Lite'. His formula is three parts diesel (diesel fuel as in full-size diesel engines), one part Fuel Lite and two parts 15-50 motor oil. According to the note it contains 20% hexane and is available from Mitre 10, Placemakers and Bunnings, and is also called 'petroleum spirit'. I had no luck whatsoever finding any liquid by that name and spent a considerable time at Bunnings, being offered barbecue lighter fluid, kerosene, mosquito flare oil and a range of other combustible liquids but - no Fuel Lite, so I let the idea slip aside for a while. Later on, when I was preparing for my fuel testing session, I tried the Internet (Googled it) again and found a New Zealand site that listed Petroleum Spirit and the alternate names for this hydro-carbon. It is sold under the names Petroleum Spirit, Calite,

'Start Ya Bastard'. I don't have the tee shirt but I do have the hat.



When measuring fuel ingredients, particularly small amounts, view the required level graduation at precise eye level, to prevent parallax error. Also be aware of the meniscus of oil - the concave (downwards) level.

My high-speed camera flash has 'stopped' one of my converted engines, but you can see the necessary elements for an Oily Hand success i.e. - plenty of oil.

FUEL MIX	RESULT/RPM
1:1:1	7,820
3 parts kerosene/1 part Shellite/2 parts oil	7,820
2 parts kerosene/1 part nitro methane/1 part Shellite/2 parts oil	8,431
1 part kerosene/1part nitro methane/2 parts ether/2 parts oil	7,898
1 part kerosene/1 part nitro methane/1 part ether/ 1 part Shellite/2 parts oil	7,982

Fuelite Brake Cleaner, Peg 1425, Pegasol 1425 and, wait for it - Shellite. In that lot you can see the names Petroleum Spirit and Fuellite, but the one that interested me the most was Shellite and it just so happened that I had a bottle of this on my fuel shelf for later testing - good things come to those who wait!

Another liquid that came up was tyre shine liquid, which is very interesting and one I will try in the future, as it seems to have good potential. I did try a flame test on it, as well as a degreaser spray and a de-watering fluid (clone of WD40, I would say) and they all showed excellent results when sprayed on paper and a flame offered up. In all cases, the ignition was instant and fast with a very healthy flame - much like Shellite, so - another day - a few more tests. For the time being, the following is a list of formulae I tried with the results, and all being used in my amazing little DC. You will note I used nitro methane in some of the brews. I have used this in the past with very good results up to 20% of the total mix replacing the same amount of kerosene. Nitro is not a great flame type explosive, but it really gets going under pressure. It will explode (as the neat liquid) when exposed to a pressure of 6:1, which is reduced commensurate with the rate of dilution. Our diesels fire up under compression, so nitro has to have a hands-up start. One consideration - it will not mix with any mineral oils - only synthetics of the type used for methanol fuels.

As a standard by which I could judge the value of each formula, I ran the engine first with 'jungle juice' - equal parts kerosene (paraffin), ether and synthetic oil. A note here, for a moment. I alternated between Morgans Coolpower blue oil and DeLuxe Power Model 2T-S, and found no appreciable gain for either oil. I would have used all DeLuxe, but I was trying nitro methane and there is no way this will mix with that oil (previous knowledge).

Using a contact temperature gauge, the average reading was 103°C, with no more than 5°C variation, which is a good reading for the head temperature under normal running conditions.

OVER TO YOU

Well, there you have it - a lot of information and background, advice on just how simple a conversion can be and, hopefully, giving you confidence in your own ability to 'give it a go'. Enjoy experimenting - you never know - it might just develop into a good habit.

LATE BREAKING NEWS

Just after I sent this article to the editor, I had the chance to try the tyre shine liquid (solvent naphtha - petroleum/ light aliphatic - butane) and Zippo lighter fluid, which is a Synthetic Isoparaffinic Hydrocarbon. I use both these in an equal part mix with kerosene and Coolpower oil and the results were excellent. Note… NO ether used.

Tyre Shine	7,800 RPM
Zippo	7,392 RPM

On each occasion, the engine ran out a 30cc tank maintaining the RPM reading to the last drop and the exhaust efflux was almost clear oil. Again, time is the problem, as I am sure certain different results can be obtained by varying the mixture ratios - something for me when I have a bit more free time, or - why don't you do some experiments and let us know the results? ●

BOWDEN TROPHY

JOHN ASHMOLE REPORTS ON THE BOWDEN CONTEST 2017 AT THE FF NATS…

They call your name, and you stride across the tarmac trying to look confident. Briefly, your cabin diesel model is checked over for compliance and for build quality marks. David asks "Ready?" Now you have just two minutes to finally check the wind direction, flick the motor into life, crouch and position the model for the Rise off Ground launch. Stay calm. If it doesn't start don't panic. Go through your personal routine again, and again if necessary. Is motor run OK? Now check fuel level, or start the timer (the choice is yours) and then comes the moment for which you have been thinking and practising since last year: the release along the runway and into the arms of Fate!

For this is the "Bowden," maker alike of legends and disasters. It always begins at 11am on the Sunday of the Nats regardless of weather conditions and will continue to do so until there is nowhere left to fly. Target time is always 45 seconds, with a zero score

2017 Bowden winner, David Mandley - organised and efficient, with Junior 60.

Brian Waterland with his OD "Lula 2" - first flick starts both times - but forgot to set the timer on his second flight.

Peter Walkinshaw with Don and beautiful Viking, before a heavy landing put him out of the contest.

Roles reversed, as Don Walkinshaw flicks his Matador. You can sense the tension.

Ray Hall's "Little Sport" with "Spirit of Stan" on fuselage, to recall the much-respected former CD, Stan Horne.

From the world of C/L Team Race, Patrick Leeman performed efficiently as expected, with his CAVU.

SAM 35 Chairman, Ian Lever, used his nicely built Ethereal Lady, but met with little success this year.

for either round if you fly for less than 30 seconds, or more than 60. For 2017, 36 entered, most of them regular Bowden participants who, in some cases, enter no other contest throughout the year.

There must be an advantage in watching what befalls those who fly earliest, but someone has to go first. In this case, it was Gary Flack (Bandit with "own made" Mills 1.3). In the gentle, but variable, breeze under light cloud, and with a growing gallery of spectators and fellow competitors ranged along the opposite edge of the runway, he set a high standard with a "43," a smooth and safe flight. We know that all free flight events contain an element of luck, but the task of the competitor is to reduce the margin of chance as far as possible. Brian Waterland had designed his "Lula 2" especially for the Bowden, and distinguished himself with instantaneous first flick starts both times - but could not account for the "brain fade" that caused him to fail to set the timer on his second flight. To use a timer, or not? The jury has been out for years. Martin Peters crouched beside his Hep Cat (PAW 1.49) to wait until the fuel reached the correct level in the tank, almost delaying too long on the first occasion, but the shortish run was saved by a good glide. Most motor runs were between 20 and 25 seconds. Even the likelihood of thermal activity must be taken into account when gauging the fuel. "My model is too light" said a Tomboy flyer, as the (slight) breeze tipped it off line at launch (and Tomboys won't gain many design quality marks, either). Using a heavier model, David Goddard (Junior 60, ED 2.46) dipped the inner wing on a shortish first flight, but had it all sorted second time around.

Novocastrian Terry Aydon, (Halfax Spartan, Letmo 2.5), who eschews timers, was efficient as usual, but overflew the target time slightly both times. Speaking of overflying, Fred Hutchinson (Snow White, PAW 1.0) flew really well, but it's a precision contest, so his over 60 second flights earned him nothing but a couple of pleasant walks on a sunny day. The only exact 45 second flight was the first of Pat Leeman (CAVU, PAW 0.8), but he fell a few seconds short in the afternoon.

As the day progressed, and after the lunchtime interval, the breeze dropped close to zero. Even that, however, can present problems - if models don't unstick quickly, the dreaded ground-looping can set in. One previous multi-winner entertained us with an unchoreographed series of "headless chicken" manoeuvres, while Maurice Doyle's experiment of fitting a tricycle undercarriage to his Bandit (Mills 0.75) worked in his second flight, but was not convincing. (Too light, perhaps?)

Thankfully, there was very little carnage, and only four flyers had to withdraw. Out of the 36 of those who started, 15 achieved scores; a good proportion for a cruelly demanding event. Of those who zeroed on just one flight, David Norwood (KK Ace: yes, that's right, KK Ace, Cox 049), came 9th thanks to a '37', Alan Husband (Buccaneer, ED2.46) gonged the first flight but then was timed at '41' which took him into "what if" territory. And what about Gary, who had started the contest so well? Big climb on the second, up and away, great flight, no score. There were many other stories to tell: the Walkinshaws, Peter and Don, went home with not a score between them, despite having graced the podium in the past (Don, Matador with PAW 1.49, piled in onto the runway first time, taxied and rose off ground beautifully second

David Goddard, well organised, with Junior 60. Flew well, as would be expected of that classic design.

Alan Husband, without whom a Bowden would be incomplete, releases his Buccaneer.

Maurice Doyle: three wheels on his Bandit, but did it help?

Bob Taylor, Bandit powered by an ED Bee, a popular model for this contest.

Ken Stanley, Veron Deacon. In with a shout after the first round, but then...

Andy Brough entertained us, but not in the Superior manner that he intended.

time, but still no reward. Peter's Viking, Webra 2.5, also went right, and fared worse). Only two flyers failed to start in the two minute time allowance - the PAW 1.0 in John O'Riordan's beatiful Scorpion just would not behave. Overflying, however, accounted for the greater number of zeros.

So, it's all about reducing the luck element. Nobody did that better than David Manley (Junior 60, ED 2.46). He was calm, even with a slightly reluctant engine first time around, he was well-organised, with a flat toolbox sporting a short Mylar streamer for precise wind direction - he had clearly thought through the entire procedure carefully. Times were 49 and 47, and build and flight pattern scores were high, due to the smooth and stately process of his Junior 60 through the air. A worthy winner!

So, are larger models better? A 2.5cc motor in a 60" job? It's worth a careful read of the rules, should anybody wish to join this merry band: especially the not insignificant marks for design complexity, workmanship, engine start, and flight pattern.

A brief final word for the team who worked before, during, and after, this popular event to make it a success - Contest Director was Dave Leeding, assessments by the very experienced Dave Causer, timing by Diane and Ian Hibbert, 'whipper-in' on the megaphone was Reg Kinsey. All, I believe, are members of the Grantham Club.

Our sincere thanks to everyone. It was a worthy addition to the continuing tradition begun by Col. Bowden himself. ●

RESULTS -
BMFA Free Flight Nationals - Barkston Heath
BOWDEN TROPHY - Sunday 29th May 2017
Final Scores & Positions

No	Competitors Name	Model & Engine	Time Rnd1 (secs)	Score	Time Rnd2 (secs)	Score	Total Deductions	Final Score
1	David Manley	Junior 60 ED 2.46cc	49	96	47	98	20	174
2	Martin Peters	Hepcat PAW 1.49cc	47	98	51	94	27	165
3	David Goddard	Junior 60 ED2.46cc	31	86	47	98	28	156
4	Terry Aydon	Halfax Spartan Letmo 2.0	56	89	57	88	24	153
5	Patrick Leeman	Cavu PAW 0.8cc	45	100	31	86	36	150

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PONTEFRACT RETRO AND SINGLE-CHANNEL FLY-IN

TREMENDOUS SUPPORT AT THE RACECOURSE FOR THIS POPULAR DISCIPLINE…

Azure blue skies, the faintest whisper of wind and temperatures in the mid 30's! That would have been the ideal situation, however, it wasn't to be. Considering the forecast in the preceding week was for rain, more rain, and blustery conditions, what greeted us on Sunday - although not a halcyon day - was perfectly flyable for the merry band of passionate retro modellers who turned up. Around 150 models graced the pits with a healthy number of pilots signed in to fly; proceedings getting underway just after 10am. The PANDAS club flying area is huge, situated on Pontefract Racecourse, but as members of the public share the space and have equal rights to meander over the verdant acreage, it was good to see safety taken seriously with a pilots briefing explaining what could and couldn't be done before anybody committed aviation. Correctly marked out and roped off flight lines, pilot box, pit areas, public safety lines and safety marshals, reinforced the necessary attention to detail taken by the organisers. Walking around the pits, I was greeted with a visual history of RC and CL model flying from the late 40's to late 70's, including a number of rare Veron prototypes from the collection of Ali Machincy. I even heard the event referenced to as the Old Warden of the North; I have to agree (irrespective of the Ed's biased views).

Themes for Fun

Just for fun each year, organisers Shaun Garrity and Phil Green come up with a "theme" for a model type and in the past (this is now the sixth event) they have had Sharkfaces, Galahads, Impalas, Biplanes, Dave Boddo designs and this year it was "Geometric Shapes". Some truly oddball designs appeared and one of the strangest flying objects was Doug Campbell's Aero Nought. Doug had designed his model specifically for the event to meet the theme criteria. Looking as though it had previously graced the pages of a 1940's Aeromodeller, it was a superb effort of traditional modelling skill, imagination and good old British eccentricity. It did technically fly as it went up, went forward and came down in one piece, but as Doug said "a little more work is required". The first flight of Colin Baxter's "Windbag", again built for the event and looking like Flash Gordon's spaceship, was eagerly anticipated. Traditionally constructed from sticks and tissue, Colin had not flown it before, deciding to make its inaugural flight on the day. He said "I have no idea what will happen, but as it took a long time to build and finish, if I'm going to crash and burn it, may as well be in front of an audience"; he needn't have worried, as

"I even heard the event referenced to as the Old Warden of the North; I have to agree (irrespective of the Ed's biased views). "

Doug Campbell's Aero Nought.

David Lovegrove's Wombat performed extremely well. The requisite lump of church roof referred to in the text can be seen behind the motor.

This outstanding model and 4cc twin inline V diesel, was built by Mike Gilham from Cornwall. The motor cylinders are similar to an ED Comp Special.

Besides winning the Blunderbird 3 pylon race Ron Buckwell makes outstanding retro transmitters - even ones that never existed!

the flight went brilliantly. The Windbag preferred being nudged around the sky, tending to Dutch Roll if provoked with too much rudder, but mission accomplished and he got it back on the ground in one piece. Another odd ball model was David Lovegrove's Wombat, a scale up of an old Pete Holland control-line model called Duplex Delta - it too defied the naysayers and flew extremely well after the addition of a substantial quantity of lead (or in David's words – church roof) on the nose.

Tracy Island

No, I haven't lost the plot but another event was the Blunderbird 3 racing – see what I did there, yes I know the heading is tenuous. Blunderbird 3 is a single channel model designed, so I was told, years ago to get school kids flying radio. Simple, cheap and quickly built, this all-sheet model was a perfect candidate for a pylon race with the strong possibility of attrition (attrition sounds so much better than destruction, don't you think?). In theory, it all seemed a relatively simple concept, with five clockwise laps around two inflatable cones, but as we all know, theory and practice don't always coincide. The fact the wind was gusting to around 20mph may have caused some difficulties, but inventive re-interpretation of the rules made for some very entertaining flying for pilots and spectators alike. In fact, it was so well received, that straight after the end, the organisers decided to repeat Blunderbird 3 Pylon racing next year (with a lot more entries, I reckon!). Ron Buckwell was the eventual winner, but rumours abounded between contestants that he had being practicing for weeks prior to the race and therefore had an unfair advantage!

Things on Strings

No disrespect intended, I love control line models - it was just a term overheard from a bewildered spectator and I thought it made an amusing heading. Dave Cowburn has organised the circles for a number of years now and very generously brought a number of hack models to let modellers have a go. "It's like riding a bike", he said, and in my case this was true. It was more years than I care to remember since I was at the handle, and no real dramas other than experiencing a slight dizziness; in fact an Ironmonger is now in the build and I've refurbished

my old Keil Kraft Firebird since the event. I counted at least a dozen models with the circle in continual use throughout the day. Dave and Nick Zotov ran the Taster Stunt competition - the winner was Dave Barber flying a Hallam Peacekeeper powered by an OS LA 25 glow.

Wes and his Wife

Wes Denton of SAM 35 organises three fly-for-fun comps at Pontefract each year (assisted by his lovely wife), each based on a simplified version of SAM 35 rules for Spot Landing, Duration and RC Precision. As Wes said, "basically they're all just climb and glide". Entries were as follows: - 9 in Spot Landing, 7 in Duration and 7 in Precision - all entrants no doubt tempted by the lure of a bottle of 'Winners Wine'. Despite conditions being breezy, the pilots flew with gusto; Spot Landing winner was Doug Campbell landing his Mini Tyro 3.5m from the spot, Dave Kaye won Duration with a Chatterbox Biplane flying a total of 7minutess 10 seconds from his allotted 24 second motor run time, and Dave Yates won Precision with his Paul Plecan-designed Simplex, landing exactly at 2 minutes, unfortunately just outside the box (blame the breeze, Dave) but having the lowest penalty score, was victorious.

Proximo Anno

The event finished around 4pm with many modellers (so I was told later) staying on flying well into the evening. Even the prospect of travelling back down to Cornwall didn't put some off. This year, the furthest travelled attendee was Tobe from Sweden. Tobe, along with Phil Green, have been singularly responsible for the resurgence of Galloping Ghost and Pulse proportional models with their 21st century 3D-printed actuator frames and custom electronic re-coders, making this quirky 60's low cost proportional system available today using reliable modern 35MHz, or 2.4GHz radio gear. A number of models equipped with this gear were flying remarkably well throughout the day.

Next Year…

Unless we are invaded by aliens, or suffer a meteor strike, I'm reliably informed that this great event will happen. The general consensus, though, was that modeller's need more retro events, so Shaun and Phil have donned their thinking caps and after a discussion with Wes, are looking into the possibility of having an event in addition to Ponte, but as they hastily added - this is early days and no promises yet: Roll on 2018. This was the second time I had visited - next time I'll bring more than a camera and notebook – this Retro RC is contagious! ■

Eating your transmitter prior to launch must be a new EASA pre-flight check.

Colin Baxter's Wingbag was a sight to behold – and surprised everybody when it actually flew so well!

A closer look at A Blunderbird climbing away from the launch – simples, yes?

INFO:
For further details on the single channel revival, have a look at their forum: www.singlechannellersreunited.co.uk and on-line museum www.singlechannel.co.uk

If you've never tried control line, you are missing a trick - inexpensive, but rewarding fun.

Wes Denton presenting prizes to two of the contest winners. Dave Kaye on the right of the photo and I believe Dave Yates on the left.

A Tobe Adams' replica driven by one of Phil Greens re-coders in a Mayfly, with the Rand on the lower right, plus a new low-cost version lower left.

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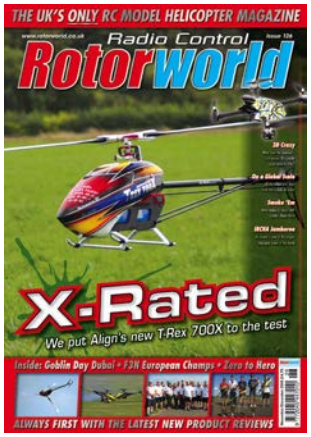
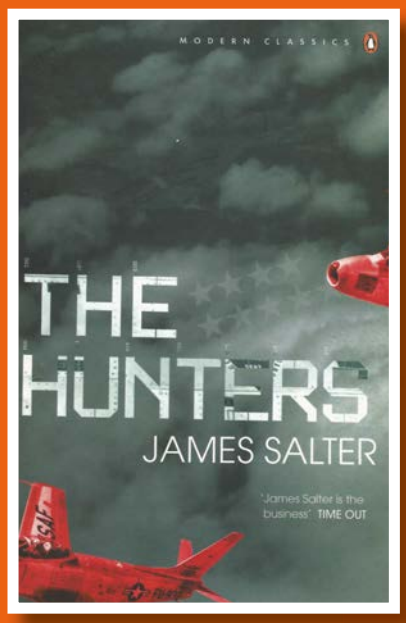


From the Armchair...

PART 22: Stuart 'Supercool' Sherlock reads about how the Mig 15 stood up against the F86 Sabre, and moves increases the power in his MB5…



"The Hunters" – In Stuart's opinion, lacking in aircraft details, more focused on the ego of the pilot.

The question of fighter tactics has always intrigued me. The classic case is that of the early battles between Spitfire and Me109. Ignoring the quality or resolve of the pilots, what seems clear to me is that the Messerschmitt was the better fighting machine. Likewise, if one compares the USAF F86 Sabre to the Soviet Mig 15 of the Korean war period (early 1950's), then the Mig 15 was the better machine.

Both the Mig and the Me109 were more heavily armed, with cannon, and able to operate at greater altitude than their contemporaries. Indeed, both these aircraft could choose the time and place of engagement, then break off the engagement at will. My own encounter with the Mig was in the camping area at the Bekeshaba C/L World Champs (Hungary) some decade ago, where there was an example sited in display on a concrete plinth.

My first reaction was to how small this aircraft

Parts of the outrunner rig. The upper motor turns the 3mm steel shaft, which in turn drives the front propeller. The rear prop drive motor magnet housing is supported by the adapter shaft (lower left), which runs on the two ball bearings buried in the housing. The adapter shaft carries the rear propeller. The front propeller mount (lower right) was rejected in fear of shedding the front prop.

is, especially in comparison with such modern behemoths as the F4 Phantom and F14 Tomcat. Emotional reaction then set in, when I recalled that this little machine, in just one or two battles, stopped General MacArthur's intention of bombing North Korea back to the stone age with his B29 Superfortress fleet.

My second encounter with the Mig - and indeed with the Spitfire - was when I took my aged mother to the Mittagong airshow, even further back in time. The display airstrip was long and narrow, so that the spectators were necessarily close to the strip. My mother was perched comfortably in her fold-up armchair when a Spitfire roared down the strip, prop tip no more than a metre off the strip. She turned to me with a look of horror and fright on her face.

To add insult to injury, not five minutes later, a Mig 15 did the same, only faster and even more noisily! That did it: my distressed and agitated mother turned to me, and in a tone not to be ignored, said simply "Take me home"!

Now a last word on armament. The raw statistic, unblemished with propaganda, on the Mig versus F86 was this. It took just 3 Mig cannon shells to down an F86, and 800 fifty-calibre slugs to down a Mig.

Now where does this leave us with regard to book reviews? The story of Spifire versus Me109 has been told many times. But I seem to have missed the writings on the Mig versus Sabre battles. So it was of interest when I came upon James Salter's "The Hunters", ISBN: 978-0-141-18864-5, 1956.

The cover review went like this: "But as other airmen rack up kill after kill – sometimes under dubious circumstances – Cleve's luck runs bad. Other pilots question his guts. Cleve comes to question himself " and "Filled with courage and despair, eerie beauty and corrosive rivalry..."

Regrettably, the text has little to do with the aircraft, and a lot to do with macho egotism. Not as bad as "Top Gun", but equally adolescent. So I am still ill-informed on the Mig versus Sabre combat tactics: thumbs down.

CO-AXIAL SAGA

The ravages of time have speeded everyone else up, otherwise my venture into coaxial-contra-rotating props would be over by now. But here is the latest.

My MB5 was prepped and ready to fly, so it was off to Whiteman Park on the first calm day. The little quad-copter brush motors were in fine form: all I needed was a skilled test pilot. My call for a brave soul was met with the rejoinder "what mode is it?" Evidently rudder and elevator on right stick was mode 2, and they all would only fly mode 1. Is nobody ambidextrous these days? So it was up to me for the job of re-kitting.

Well, it was all very embarrassing. At full throttle, the model moved six inches and stopped. Then the rear prop then disengaged, so that was that. The pinion gear had slipped off.

Now a more sympathetic chap looked the model up and down, weighed it by hand, and declared it would need 70 Watts to fly. Oh, unfortunate, I had just 10 Watts installed. So my earlier prediction that the model would not fly, was not just correct, but unflyable by nearly an order of magnitude. Something needed to be done.

MEGALOMANIA

The same chap seemed to think brushed motors were obsolescent, and that I really should use outrunners (?). So it was off to Ace Hobbies for instruction in outrunners. These look like little generators, quite futuristic. The magnets are on the perimeter of a wheel, doing all the spinning, while the armatures are fixed in the centre (not rotating). I bought two; they seemed to be about 70 Watts each, so I was not going to be caught shy on power again.

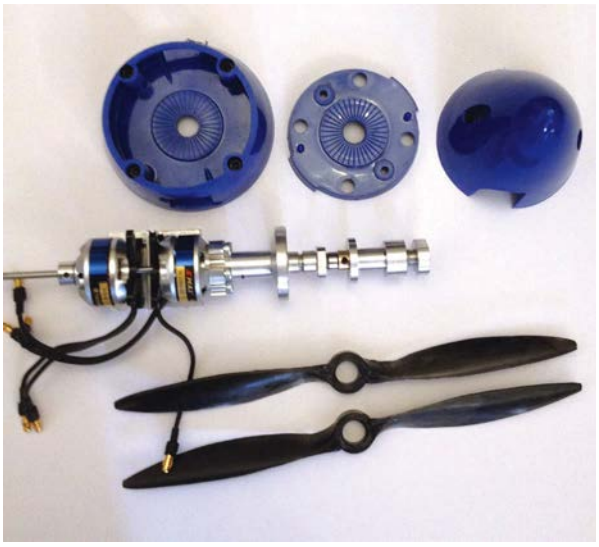
Whatever, I found a guy on You Tube who showed how to convert the outrunners to a co-axial contra-rotating power system. His conversion was done using only a drill press, which was quite a task, as there is definitely a need for precision work in this conversion. I would not have attempted it without my lathe and CNC milling machine.

A novel feature of outrunners is that they can be run in either direction, just by switching a wire around. This adds interest, as having run the system as torque-free, one can then have both motors running in the same direction to see the effect of torque and other prop rotation asymmetries.

The set-up is shown in the photos. I am still working on the mounts into the MB5 nose, so hopefully by the next issue I can draw this rather repetitive saga to an end!

The "real end" comes when I fly this model FF. Hopefully the co-axial contra system will improve spiral stability, as I have the dihedral set at the scale value of 5°, definitely very "iffy".

[The You-Tube presentation is by M Clay, March 14 2016, using two Hextronic DT750 motors] ■



***FAR LEFT:** The original low-power quadcopter lies alongside the new outrunner system. No machining was required for the quadcopter set-up, but the outrunner system required precision machining for housing and aligning the ball races which run on the steel shaft. The mount to the airframe is still under development.*

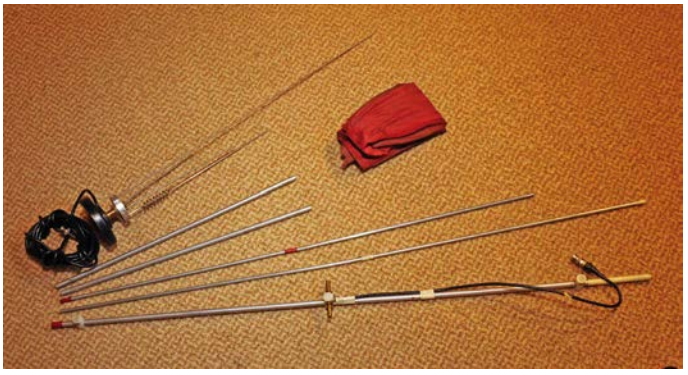
***LEFT:** All the components are here assembled. Noteworthy are the two collets (with grub screws), added as safety measures to stop the whole thing disassembling by accident. The grub screws are tightened onto flats ground in the 3mm steel shaft. The props are 8" x 7".*

Part 34
BETTER... RETRIEVAL 3

Dave Hipperson continues the 'Better...' series on retrieval with input from other modellers. This month tracking bugs, installation and battery care.

Before we start learning the craft and getting precise about everything let us for a moment celebrate the fact that there are still people – members of the public – out there that care about us. *Some years ago Kris Best in her first year competing and ably assisted by our very own Stuart Darmon was flying in the Moncontour Mini event in France that precedes the annual traditional Poitou. Her Coupe d'hiver model was sucked skyward vertically on one flight by one of the dust devils that the place is famous for. It was still ascending fast when it went out of sight. No bug in the model (not then, she does now) so really no way of knowing when nor where it might have come down. Lost. Well and truly lost. A few days later on the first day of the main F1A event the model simply appeared at the control desk. A bit of damage to the tail, but otherwise OK. A farmer had discovered it in his field and having read about the Poitou Vol Libre event in the newspaper, found out exactly where the competition was being held and brought it back from 25 kilometres away! He simply gave it to the organisers and refused any recompense. Wonderful. Reunited with her model Kris then admitted that in future as well as putting a bug in her models she would remember a name and address label too! Possibly not in her case, with such chivalrous French farmers about.*

Examples of the author's favourite receivers. Note the lanyard, made from DT fuse.



TRACKING WITH TRANSMITTER BUGS

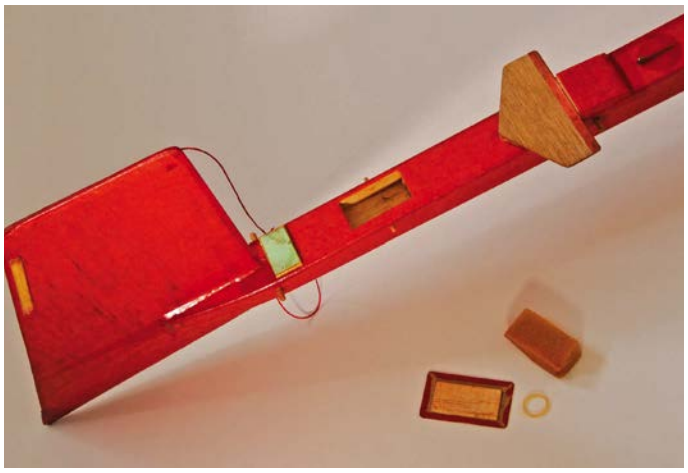
I have had plenty of time to watch how others do this and in the main they are far too casual about the technique they use and the equipment itself. Nowadays since the demise of a supply of bugs from the English firm that made Bio-Track units, all the bugs come from Pym Ruyter. I say all the bugs, but this is not completely true. There are other manufacturers, it is just that Pym has had the most experience and can be relied upon in every way. His are not the cheapest bugs either, but really, economy here could be rather like buying a cheap parachute - it will nearly always work! The trouble is, the time it doesn't is when you really needed it to! They are £80 or so – the bugs, not the parachutes. (Since his beginnings in this manufacturing venture in 1990, Pym has now a customer base covering 40 countries some 3500 persons with on average two bugs each. I think that must constitute the most experience - and he is still producing them.) Your model, even if a simple P30 or HLG, is worth way more than the price of one bug, not to mention the value in prestige of the comp you are not going to win because you couldn't find it in time for the last flight. I have no personal experience of other makes, but neither have I ever heard any complaints about them. I am simply suggesting the way I know that works for me. Invest and buy as many as you can, and on more than one frequency, as there will be times you will have to fly a reserve when the first model is still lost. The last thing you want to have, when you get downwind, is to hear two bugs on the same frequency. It's mighty confusing. I never quite ever made four fly-offs on the same evening as I explained a few months ago, but I was regularly in three. Imagine how many bugs that requires, if you have reserve models ready as well. The sum is easy - six bugs on three different frequencies. Cheap at ten times the price, whichever brand you buy. (Recently I saw on a television nature programme a bug being attached to a tiny bat! So there may be even smaller and lighter types out there which may be worth investigating.)

The most regular complaint I have heard of with the traditional Bio-Track system, is one of failing battery connections to the transmitter bug. This is very rare with the Ruyter system. Furthermore, the gear is a bit cumbersome and it tends to dissuade some people from having it on their persons all the time. How often I have heard or seen someone "come back for the Bio-Track", hence allowing their precious model to get even further away from them.

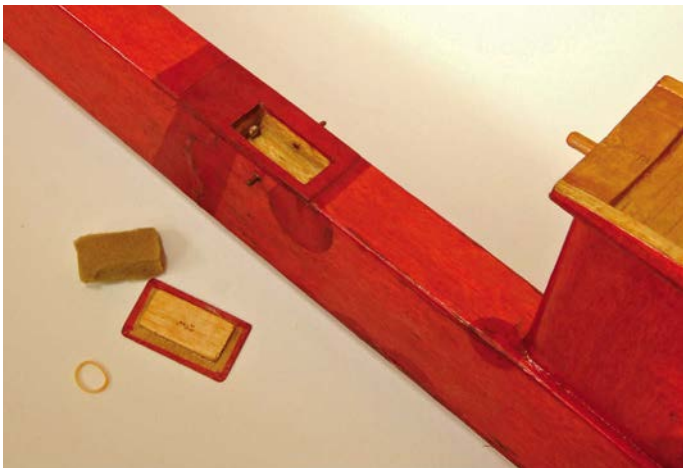
My preference for a receiver is the C150 or C160. (Also available from Pym Ruyter.) The former is available again now and is marginally more sensitive than the latter. Both sensitivities have their uses. There are smaller units, but in my experience although cheaper, they are not as sensitive. The C150 and C160 are, of course, also communicators, however, to use voice over them in the UK, requires you to hold a ham radio licence. You can use that feature in an emergency, but be aware if you don't have a licence you are breaking the law and the authorities do listen and sometime send inspectors to gatherings where radios might be used. There have been instances of arrests and large fines at falconry meetings, for instance. Best use your phone for talking. The Bio-Track receiver (totally legal) is much more cumbersome with it's integral Yagi aerial, which for most recovery missions you won't need. It's also a lot more fiddly, although generally now more reliable, than in its original form, since attenuation improvements and Ruyter bugs can now be made specifically to the Bio-track frequencies.

Now these C150, C160, and other similar radio sets, are versatile and convenient to carry. Always with a lanyard around your neck and then clipped to your belt. Never put your radio down on the ground for any reason. Pym Ruyter himself did this once when he was over here flying at the Stonehenge Cup. It took us a heck of a long time to retrace his steps until we found it. Furthermore, if you leave it lying around it may get damp, trodden on or even pinched – even I would be tempted! Wear it like Jim Hendrix wore his guitar – all the time (not necessarily in bed) that's how you get good with it – the radio that is!

Keep it on you at all times. Initially start with the rubber aerial they come with. Ray Monks built me a dedicated Yagi to cover my frequencies as mentioned already. I thanked him under my breath every time I had cause to use it. There is an excellent article by George Sharp in Dec 1997 - Jan 1998 AeroModellers explaining how to design and build one to suit your frequencies. The wavelengths of your bug alter the dimensions a bit - not much - nearly any Yagi will work, but one built to your frequencies will work better and there will be times when you need all the help you can get. One of the secrets is to have confidence and faith that you will always find the model. The model is the valuable bit - the bug is not. The better your equipment, and the more polished your



Bug box in a Dixielander. Unusual location as the Dixy invariably needed tail ballast. I started with putting the bug there. Good too, as it isn't in a stressed area. Note the lid and tiny band to hold the lid on and once again, that foam plastic pad for packing.



Similar installation on a more conventional power model fuselage. Here you can just see the drinking straw that guides the aerial down the fuselage.

For rubber models with this convenient pylon arrangement, the bug box can be under the wing and the aerial guided into and along the fuselage in a drinking straw. Make sure the bug body is a nice tight fit.

FIRECRACKER - FRANK RUSHBY. This NOT the way to do it. Frank has simply tucked his bug under the wing bands. The bug will come away from the model if the wing comes off, the public will see the aerial, and it might even affect the trim.

technique, the greater chance you have of finding your model, so don't be afraid to practice.

So that's the basic electronic equipment - a collection of bugs, a radio and, as a first extra, a Yagi - and next extra, a roof aerial. You are ready to go - just lash the bug to the model. Oh, no you don't!

INSTALLING THE BUG IN THE MODEL

Another area where a little forward planning can help enormously and make everything so much easier for you. HIDE THE BUG. I know to begin with, you will be proud of your new asset and will want to let everyone know you have got a bug in the model. At least, that did tend to happen a few years ago when we first started using them. Some crafty camouflage is only sensible - and here is why. The public are curious. Make your model look as uninteresting as possible, particularly in this day and age of electronic gadgets. I know it's great fun to have aerials sticking out all over the place, but it's a bad idea. First, they can get tangled in things - clothes, grass and tree branches. Much more importantly than that, however, they make the public think of radio control and radio controlled models must be valuable. It increases the chances of a marginally honest person taking it home and keeping it, rather than getting it back to you. Try not to advertise the likes of RC DT, or electronic timers, either. Don't be flash. Keep them as discreet as possible. Hide antae, or build them into the structure, somehow. A vertical tracker bug aerial may give you a slightly greater range, but it has very serious disadvantages when tracking, which I will come to later. Furthermore, it tempts the public. Hide it in a fuselage or wing – the same with RC DT aerial.

If they realise it's a tracking device, they will throw the bug out before they take it home. You may well find the bug and nothing else. Does happen, but it never has to me. The last position you want the aerial is sticking straight up out of the model - and this is why. Apart from it being obvious to thieves, it gets badly masked when the model blows over, especial if in wet grass. However, most importantly, it gives a constant signal whether the model is still or moving. This is not good. Install the bug and aerial so the aerial is horizontal. This way the signal strength will alter (wax and wane) when the model is flying. Less signal when the aerial is coming towards or

away, and maximum signal when the aerial is across in front of you. You don't think that matters? Oh yes it does. You can listen to a model far away and know its still flying and not just up a tree. Up a tree, the signal will be steady in strength – when flying it will oscillate. Thus you always know when it has stopped flying.

To install, I build a little box for the bug and connect it to a tube made of a drinking straw for the wire aerial. This can be enclosed completely in a fuselage or inside a wing. Two-part wings are a real boon for this, as it's trapped easily by the other wing half when the model is assembled. It is a good idea to build the system so that even if the model comes to pieces on landing or in a tree, the bug stays put in the model. Remember though, metalised Mylar and carbon will shield the aerial and you won't get a signal if you run it inside a metal covered boom, or silver Mylar covered wing or carbon D box. In these instances, it may be necessary to have the aerial outside, but try to make it as inconspicuous as possible.

Bernard Aslett tells the tale of a bug he lost and how a lady came to his rescue - and no ordinary lady. At a Nationals, he had had a 1/2A power model dive abruptly into some long grass. The impact dislodged the wing and this in turn allowed the tracker bug to come loose. It had disappeared into the grass somewhere. No problem, switch the radio on and – no signal. The battery had come out, too. Now this is the bit that I suspect. Bernard swears that Kath Watson came to his aid and lent him her long toothed hair comb with which to rake the grass. It worked! He found it and gallantly replaced the comb with a new one. If that was merely a dream, which I expect it was, then I had no idea until now that Bernard had a bit of a thing about the former BMFA Chairperson Kath Watson, but quite clearly he does.

The very first time I appreciated the attraction of the tracker bug was when in a wood with Anselmo Zeri at Terlet in Holland at the Midsummer Nights Trophy event. He had tracked his Cd'H into the trees and found it up one. We had got it down and then as we exited, he realised the bug had fallen out. We went back in and in the leaf litter, pine needles and grass, he coolly went about finding this minute device with his magic Ruyter radio. A couple of passes and he dug down into the leaves and there it was. I was astonished. With a little practice this becomes a piece of cake.

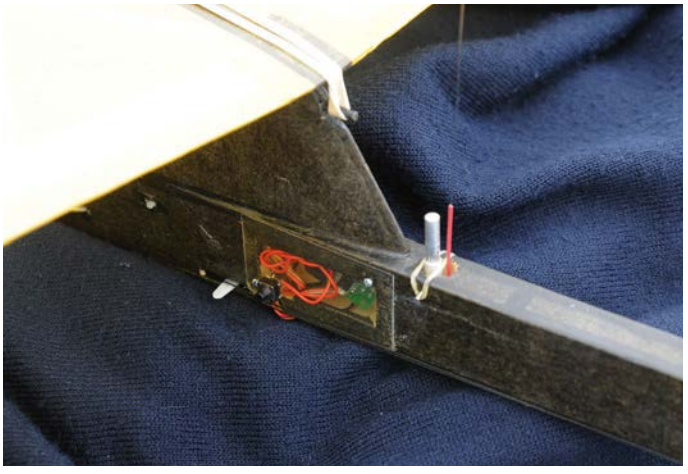
Chris Edge had a similar experience when a bio-track bug fell out of his model when out trimming. As ever, the last flight, so it was nearly dark. By the time he had realised it was missing, it was properly dark and to make it worse, he was flying over long grass. Garry Madelin, who was with him, bet he could never find it and, like it might have been to me, that was a red rag to a bull. Reducing the size of the aerial, Chris eventually got it down to a one yard square and did the rest by gently raking with his fingers. He found it. Thankfully he didn't find anything else - know what I mean?

FLYING

So now you are ready to go. No, not quite. The bug itself needs some tender loving care. too. Insert the battery and double check it's not loose. In the case of the Ruyer system and others that use cylindrical batteries, squeeze the sides of the tube ever so slightly. Check the contacts are good and it's sending out a signal. Now leave the battery in until you put the bug away at the end of the day. I have heard of people removing batteries when they find their model to save battery life. The same people then fly the next flight having forgotten to re-insert the battery and the first they know of this is when they switch on their receivers straight after launching, and that's the one in the big thermal, for sure. Furthermore, with the battery out of the bug, there is no chance in heaven of you ever finding it if you drop it, or it falls from the model. I have had bugs fall out on the way back upwind when a model has been badly damaged and the bug box exposed. It's one of the reasons I leave the receiver on all the way back. I can hear the bug. I know I have got it. If it fades out, I know I have dropped it in the grass and I can go back and pick it up.

Best that the bug cannot fall from the model in the first place, even if the wing comes off, and always make sure the battery is tight in its housing, too, if only for electronic continuity. With the battery in the bug, it should always be findable. Some people like to wrap them in fluorescent tape, but I think if they are a light colour that's enough. At the end of the day, return the bug to its bag and make a note of how many hours the battery has been on - usual life, 200 hours, I seem to remember. Try to avoid using a brand new battery on contest

MINI WEAVER - RON MARKING. I was there when Dave Posner brought the first one of these out to the flying field. This was the best version I had seen since that day. Beautifully built – and in some ways even prettier than its larger brother the Dream Weaver, however…



RON MARKING'S MINI WEAVER INSTALLATION. Ron has installed the bug with the aerial vertical, which is a bad idea for all the reasons I have given. Furthermore, he has covered what looks like an interesting bit of electronics – RC DT and/or electronic timer (?) with clear plastic. Much too tempting – even I might steal this.

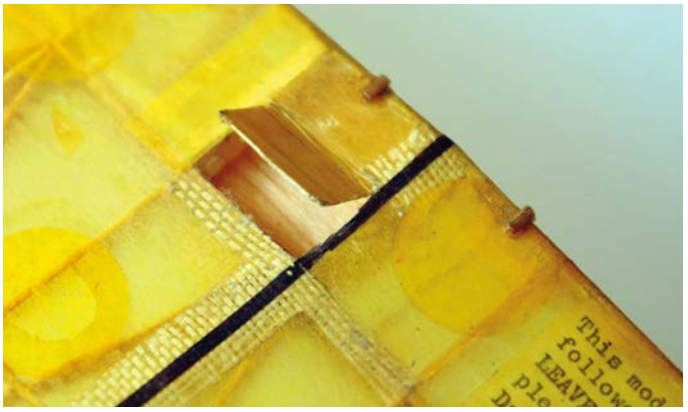
RON MARKING MINI WEAVER – LOST. Same model, same guy – perfect launch. It never stopped – well, not for thirty seconds, or so. No problem, reach for the radio – let's go searching! Trouble was, first his radio was in the model box, so he had to come back for it. Secondly, because it hadn't been 'on him', he hadn't checked that it was receiving and it wasn't. That was a beautiful model in perfect trim lost unnecessarily.

***SHOULD THAT RADIO BE THERE?** This is Ron's radio all on its own in his model box, whilst he was out about to fly his Mini-Weaver. Don't do this. Wear the radio like you would your trousers. Never be without it (or them.)*

flights. Like all aviation equipment, slightly used components are more reliable than brand new ones. If they are going to fail, then batteries will fail very early in their life – after a few hours. I have had this happen just twice, so it's not that common. Get them past this stage on trimming flights, or even use them deliberately to go past, say, six hours. Keep a note of how many hours use all your batteries have had. I usually retire them at 100 hours, as using them past that starts to eat into the time you will have available to find the model. Often it may be necessary to come back – 100 hours is only four days. Its rather more comfortable to have a week, so that you can go searching again the next weekend - so that's 160 odd hours really, otherwise you are going to have to take some time off work! So from that original 200, it's really down to 40 hours, but that's five full comp days and they are very cheap, after all. Actually, in my experience, they go quite a bit past 200 hours usually. Of course, some of you with other electrical apparatus on board may well be able to tap into a larger reserve of battery life. Feel free! We are considering the smallest and most basic bug set-up here.

Next month even more stuff that you can carry with you to help! ●

End-on view of a typical C d'Hiver wing half, showing the oval hole just in front of the joiner tube to accept the tracker bug. The fine wire aerial is guided down through the wing ribs in a drinking straw, the end of which can just be seen.



A solution for one-piece wings. A little hatch underneath kept closed by the wing mount when the wing is in place on the fuselage. Sometimes Sellotape, too, as if wing comes off the bug can fall out.

FLYING WITH CAPACITORS

Duncan Pepper shares his experiments with a 360F Capacitor powered FF model, based on an A1 glider…

No sooner had I laid down my pen from writing the Capacitor Potential article in the December Aeromodeller 2016, when Maplin suddenly started selling a masssive 360 Farad capacitor that promised even more potential for free flight power - I could not wait to get my hands on it!

There is surprisingly little information on this beast - none in the manufacturers website, so what is known is summarised in **Table 1**.

People often ask me how long does it take to charge up to voltage? Well, it depends entirely on the charging current - **Table 2** shows how long it takes to get to 3V on load, which in reality corresponds to 2.7V offload. Never connect this capacitor directly to a battery, as it may blow a fuse or melt wiring. Always charge via a current limited charger, an old NiCad or NiMH will do fine if they can manage 5A, but increasingly a digital LiPo charger can be used, just set it on the NiCad or NiMH settings.

So, about 4 minutes at 5A - a lot quicker than a LiPo

To extract maximum power out of this beast, needs a low resistance motor and I was fortunate in finding just the job in a KP02 from Derek Knight (KP Aero). This

The 370F capacitor fitted to Duncan's powered FF glider, fitted using two cable ties. Note the skid/ towhook, which protects the prop on landing.

measured 0.44 Ohm when running, which is just fine. Choice of prop is also critical and experience has shown that large diameter, shallow pitch, props seem to be best at generating thrust, at least in this application. I tried many and finally settled on the GWS 9" x 4.7" which still comes in a choice of material. The common orange one has a rather fiddly central boss, but the matt black one has a more substantial hub which can be drilled out to 6mm and used like a Morse taper to push onto the outside of the KP02 drive .

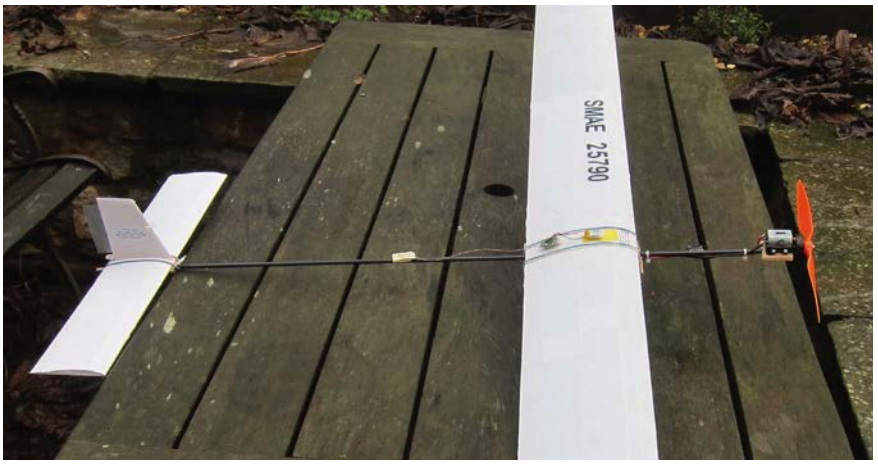
You may have to search the Internet under Grand Wings Servo to get supplies of the black prop, as it is not widely available. I did try some of the newer carbon fibre props aimed at the drone market, but these proved unbreakable in a hard landing - and bent the motor shaft on the KP02!

The discharge time (via the KP02 motor), thrust, rpm, current and voltage are all summarised in **Table 3**.

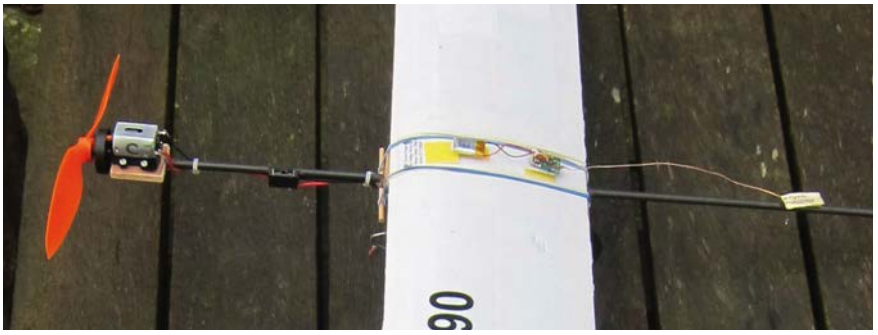
The prop finally comes to rest after about 330 secs, so you get a decent amount of thrust up to about 30 secs, followed by a slower decline. Assuming the model will fly with an all up weight of twice the maximum thrust, gave me a target weight of around 240g.

The plane

I chose the Westwings A1 glider ''Amethyst" kit as a suitable test bed. I discarded the conventional fuselage to save weight and replaced it with a lightweight wrapped carbon fibre tube (OD 5 mm, length 762mm, Goodwinds LLC, part number 020204). A tail rest was fitted at 0° and a wing rest at +5°. The fin was moved onto the tailplane and the airframe weight came to about 120g. The capacitor, motor, wiring and prop came to about 115g, giving an all up weight of 235g, i.e. just about on target. The capacitor was conveniently fitted below the fuselage tube and directly under the main spar by means of two nylon tie-wraps fitted into two corresponding circular grooves in the body of the capacitor. The undercamber on the wings allowed the tie-wraps to go over the wing mount without disturbing the setting. Short lengths of 27 x 0.2 wire connected the capacitor to the KP02 motor, which



A view of the modified Westwings 'Amythest' glider, motor mounting and inline switch.



An overall view of Duncan's 370F testbed model.

Detail of the tail end. Note the position of the tracker unit on the tube.

TABLE 1

Maplin part number: N53QQ
Price: £13:99
Weight: 68g
Dimensions: 63mm long, x 35mm diameter
Nominal rating: 360 Farads, 2.7v, 0.365Whr
Manufacturers Website: www.nesscap.com

TABLE 2

Charging Current	Time to reach 3V on load	Energy Input
2 Amps	572 secs	2.09 kJ
3 Amps	433 secs	2.22 kJ
4 Amps	317 secs	2.10 kJ
5 Amps	265 secs	2.00 kJ

TABLE 3

Time	Thrust	rpm	current	voltage
0 sec	133 g	3,700	5.34 A	2.47
15	112	3,400	4.68	2.33
30	97	3,200	4.32	2.19
45	84	3,000	3.94	2.06
60	73	2,800	3.72	1.93
75	66	2,600	3.49	1.81
90	57	2,500	3.28	1.69
105	48	2,200	3.15	1.57

was clamped via a saddle onto the front of the fuselage tube. A 10A auto fuse and holder was fitted in line, to act as both a switch and safety feature in the event of landing prematurely with a stalled motor. Later experience showed that a tow hook come skid mounted below the capacitor could provide additional protection to the prop and motor.

Flying

First flights were promising, but needed about a 1/16" packing under the tailplane. Subsequent flights on Salisbury Plain saw it up into the (low) cloud base. All in all, a delightful model to see flying, with a nice lazy unhurried style. I hope to post a short 2 minute video clip on Youtube and Facebook, search for ''360F capacitor plane Salisbury Plain", or https://www.youtube.com/watch?v=a4ilodb2Emg

POST SCRIPT

Sadly, shortly after completing this article, Dr. Duncan Pepper passed away after losing his battle with Cancer. We publish this article to honour him. Hid good friend, John Kay, has written the following words in his memory. ●

Dr. Duncan Pepper – Obituary

I first met Duncan at a David Baker 1066 August meeting held at Middle Wallop in the early 1990s. Duncan was a medical scientist by profession, but had a lifelong interest and association with building and flying model aircraft. Both of us were flying 'free flight' and we spent many hours retrieving wayward Tomboys and flying wings using a compass and GPS.

In 1997, Ken Croft produced a sheet for a DIY tracker system. With this information, Duncan taught himself to solder under a microscope and managed to reduce the size of the bugs to a tenth of the original. Now, the lipo battery was the largest part of the system.

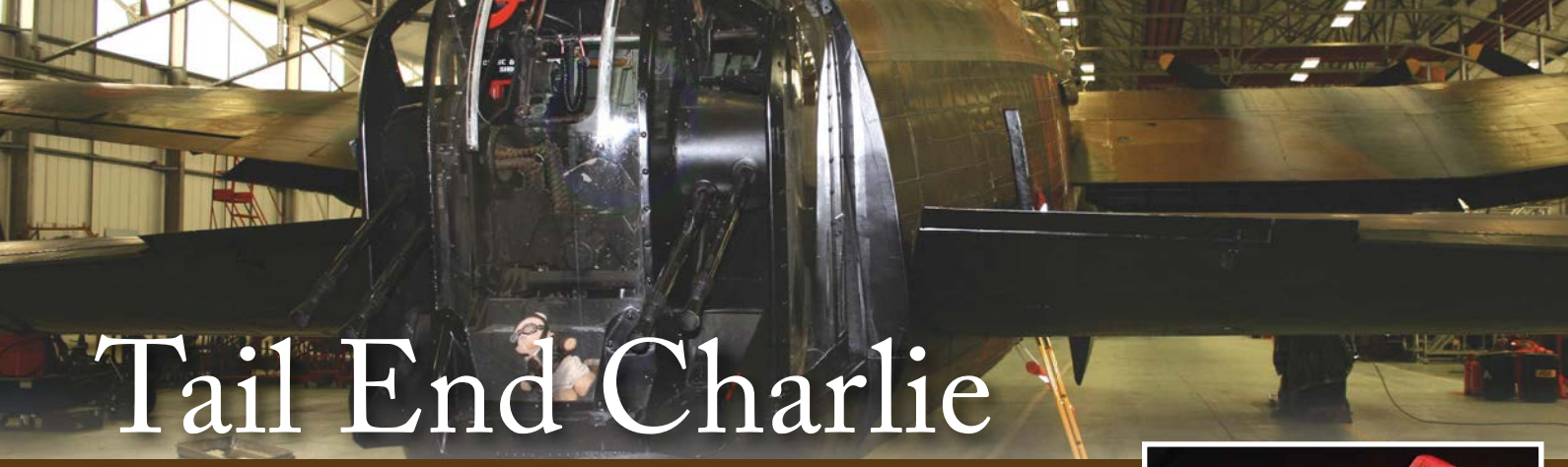
Duncan met Gareth Evans flying a capacitor–powered 'Mariarty' at one of the Old Warden model flying weekends. He was taken with the untapped model power source and it led to tests over the following winter, culminating in the article for the AeroModeller in December 2016.

Duncan was not well over Christmas 2016 and in February he had been diagnosed with liver cancer. By the end of March he was frail, but had a chance to be given a steroid that he told me was used by body-builders. This gave him a new lease of life, it enabled him to carry out more tests, and write the preceding article.

His Bristol & West MFC friends were able to take him flying to try his latest multi-engined capacitor models. Duncan died on 10th June, 2017.

Dr. Duncan Pepper in his workshop, circa late 2016.

Buyers Guide



Tail End Charlie

Some ideas going around and around...

More Rocket Science

Thanks to Ken and Sheila Sheppard along with their helpers, the Old Warden Modelair Mayfly event was the usual great success with the weather gods once again bought off for the weekend.

I met Neil Sommerin and Henry Poniatowski there and thanks to them I have a selection of Rapier motors to play with and plenty of advice on how to play with them. More advice came from Roger Simmons (who I failed to find at OW) and Blaine Stone who commented from the USA that a very simple mount and some foil lining was sufficient protection for his little red Rapier powered Me163. Sadly, living in St Louis USA, he is currently unable to get new motors for it. Can any other reader over there help him out?

Incidentally, if you want to see his picture he writes *"I'm the old-bloke pictured on page 57 of your issue 948 (May 2016)" – He doesn't look that old to me!*

Radio Assist at Old Warden

Then John Hancock commented on the 2017 rules for Model Air events:

"Having spent a grand day out at OW last week a thought occurs having observed the new F/F arrangements.

Many years ago I was a happy participant in "Flying 15" events, resurrecting my Mk1 Mills to power a Little Vagabond. I quickly discovered that flying a light loaded – basically F/F model in any sort of a breeze with only a rudder (no throttle) was not sensible. To trim it I needed an elevator. No aerobatics, it was not a Shark Face. I just needed to prevent it going backwards downwind. Wind speed at 150 feet can be very different to that at GL.

Models with rudder only are RGM (Radio Guided Models). RTM have longitudinal trim capability – easily converted to RTD with the rates switch.

I subsequently flew the Vagabond in many small tight spaces and found its' simplicity a delight. I still have the Mills, but old age and diesel fuel wore the model out years ago."

Fuel Soaked Models

Like John, I've found it impossible to repair fuel soaked models and if the model as a whole is worth saving I've cut away all traces of fuel soakage and grafted in new wood. However, Alan Cantwell says he has a method which avoids that, writing;

"I've rebuilt some right old oil soaked aerobatic classic models,

Here's my method: Talc is ok for volume spillage, ruptured fuel tank etc, but standard soakage, I soak a cloth in meths, wipe the contaminated surface, soak it, let it soak in. Now, the meths will evaporate, but will leave the fuel in, so, use a hot air gun, but be careful, meths is inflammable, for this reason, have a very damp cloth next to you, and put the lid back on the bottle! Gently heat the surface, the meths will rise, and bring the oil with it, just wipe away, when the oil stops, it's done."

Well it sounds simple, but obviously needs care or you may end up needing to rebuild a workshop from a pile of cinders! Outdoors with a long extension lead for the hairdryer seems to be the best option to me. Please let me know how you get on if you try it.

Another Vickers Gun

Finding his "Williams Kit" was too large and not having a 3D printer, Graham Farmer adopted the low tech approach when he needed a scale Vickers gun for his Veron Sopwith 1&1/2 Strutter. He simply used a hardwood block for the breach and some dowel for the barrel. The rest of the parts list included a bottle top, part of ball-point pen, model car steering wheel (sight) & various levers from an old type writer. For the bullets he used small brass hollow rivets & dress pins.

I think you'll agree that his result is quite impressive.

Moving Forwards

Often involves a Propeller if you are using an aircraft. Someone wrote to me the other day stating with great authority that *"higher revving props are less efficient".* My reply was that this is at best a part truth as taken to its logical conclusion the assertion would make a stationary prop the most efficient of all!

So, I turned to the Supercool Bible to see what the real Sherlock says and found this gem:

"Now a propeller is most efficient when all the air in the slipstream has much the same axial velocity. If the entrained air has a lower velocity than that downwashed at the blade surface, then efficiency is lost."

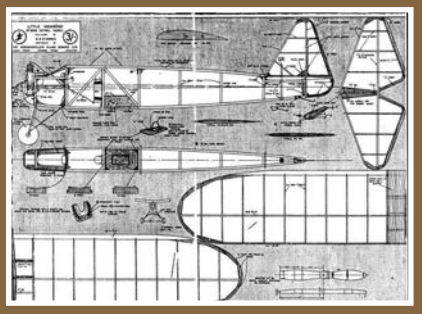
Clearly the time has come for a Supercool article on "Prop Selection & Design for Dummies".

Finally, comments, complaints and anecdotes direct to me at chrisottewell@anworld.com or by snail mail via the Editorial offices please. ■

By Chris Ottewell

Blaine Stone's Rapier powered Me163.

Motor Mount and Foil protection on Blaine Stone's Me163.



Little Vagabond Plan.

Graham Farmer's home built Vickers Gun.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